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PROJECTED AMERICAN LINE OF FAST OCEAN STEAMSHIPS.

The decline in ship building and shipping interests, so noticeable in the United States, promises to be retarded, by a new project now being promoted by prominent capitalists in this country; the project being nothing less than the establishment of a new line of very swift express steamships, calculated to cross the Atlantic in five and one-half days.

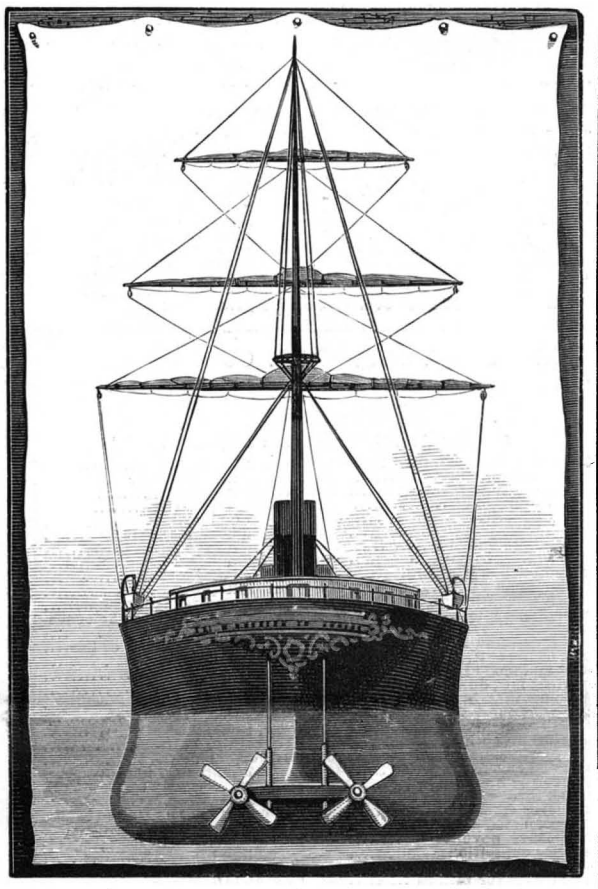
The importance of shortening the time of passage to this extent can scarcely be overestimated. It would not only facilitate business transactions between this country and Europe, and add greatly to the comfort and convenience of passengers, but would also increase the amount of service accomplished by each steamer.

This new project is based on a novel form of vessel, which render high speeds possible, while at the same time adding greatly to the carrying capacity as well as the stability of the vessel. This new model is the design of Captain C. G. Lundborg, who has patented it both in this country and in Europe.

While the general appearance of the vessel is shown by our engravings, it will be necessary to enter somewhat into the details of construction, and into the theories upon which the new construction is based.

The design, while affording ample space for passengers and valuable cargo, has been prepared with the primary object of attaining a velocity of twenty to twenty-one knots an hour, with a comparatively moderate expenditure of power. The prominent idea involved is that of making the main body of the ship divide the water horizontally instead of vertically. By adopting this system of construction it becomes possible to build a ship of the greatest capacity for a given draught—an advantage which speaks for itself. But besides this it is also evident that this ship of shallow draught and great capacity can have admirable lines. In other words, her resistance may be reduced to a minimum. The principle admits of the naval architect imparting to his ship a splendid clean run aft, and the screws can be carried far astern and yet be well supported. The advantages to be derived from thus placing the screws far astern have been insisted on by the late Mr. Froude. It will also be seen that no scheme has ever before been put forward which is so perfectly adapted to the use of twin screws. When it is desired, the stern of the ship can be carried further aft, to protect the screws; but this, it is claimed, would probably be unnecessary. There is ample room provided for engine power, notwithstanding the excessively fine run of the hull aft. The accompanying table contains the principal dimensions and other important data:

Length of hull below water on the plane of greatest beam	450 feet.
Greatest breadth	66 "
Length on load water line	444 "



STERN OF CAPTAIN LUNDBORG'S STEAMSHIP.

Breadth on load water line	58 feet.
Draught of water on load water line	23 "
Length over all on upper deck	475 "
Breadth on upper deck at greatest transverse section (outside of frames)	62 "
Depth from top of upper deck beams to bottom plating	41 feet.
Height between the upper and second decks	9 "
Height between second and third decks	9 "
Height between third and orlop decks	8 "
Area of greatest immersed transverse section	1,412 sq. "
Coefficient of greatest immersed transverse section	0 09303
Area of load water plane	15,255 sq. feet.
Displacement to load water line	380,836 cubic "
"	10,881 tons.
Horizontal distance of center of buoyancy from the submerged stern	225 feet.
Vertical distance of center of buoyancy below load water line	11,456 "
Height of metacenter above center of buoyancy	7,469 "
Height of metacenter above center of gravity of the ship when fully equipped and loaded	3,458 "
Height of metacenter above center of gravity of the ship at 14 feet draught of water, with no cargo, coal, stores, water, or ballast, and no water in boilers, but otherwise completely fitted and fully rigged	5,060 "
Height of metacenter above center of gravity of the ship at 9·6 feet draught of water, the hull being complete, with masts in and rigged, but empty, without engines or boilers	11,389 "
Wet surface when immersed to load water line	38,040 "
Angle of obliquity of load water line at the bow	5° 50′
Angle of obliquity at the stern	6° 30′
Mean angle of obliquity at entrance	7°

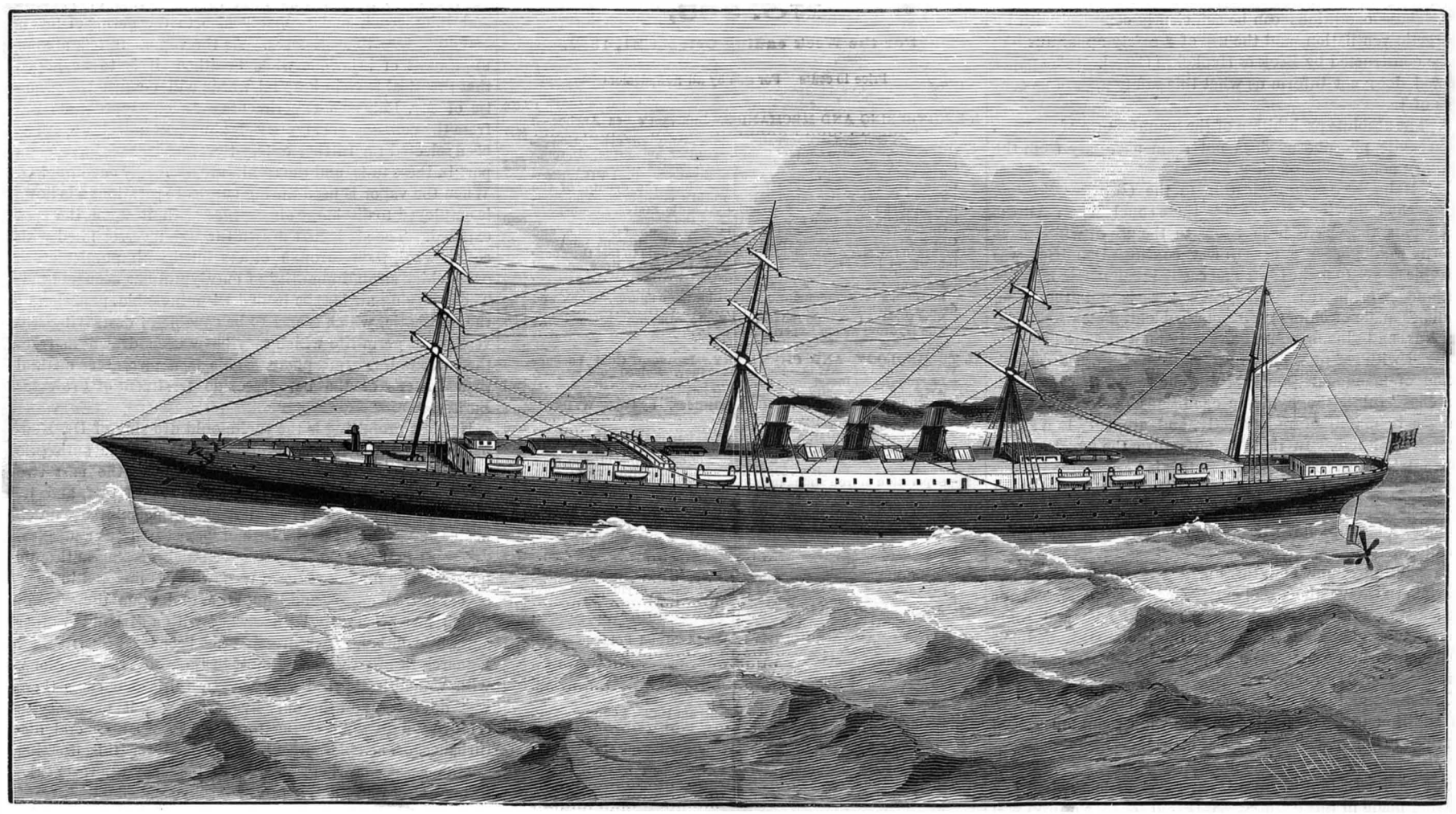
The ship is to have two propellers of 16 feet diameter and 28 feet pitch; the propelling power to consist of four compound engines, two on each propeller shaft, developing each, when making 90 revolutions per minute, 4,500 indicated horse power, or for all four engines together 18,000 indicated horse power.

With this power the speed, according to Professor Rankine's formula, would be 20·7 knots per hour; but that speed would in all probability be exceeded, as little power will be lost by wave making, the water having a clean run astern, being divided horizontally by the lower part of the hull.

The ship would have room to accommodate about 600 first-class and 1,000 second and third class passengers, and carry 3,000 tons of cargo, besides 2,700 tons of coal, sufficient for 180 hours run.

The ship is designed to be built of iron or steel, with a double bottom, and with a great number of water-tight compartments, transverse and longitudinal.

The peculiar form of the hull of this vessel makes it possible to unite great carrying capacity with the finest lines for high speeds. The submerged stern, which divides the water horizontally, admits of the finest possible run aft and affords a perfect support and protection to the propeller shafts. With this construction the propellers act constantly



CAPTAIN C. G. LUNDBORG'S FAST OCEAN STEAMSHIP.

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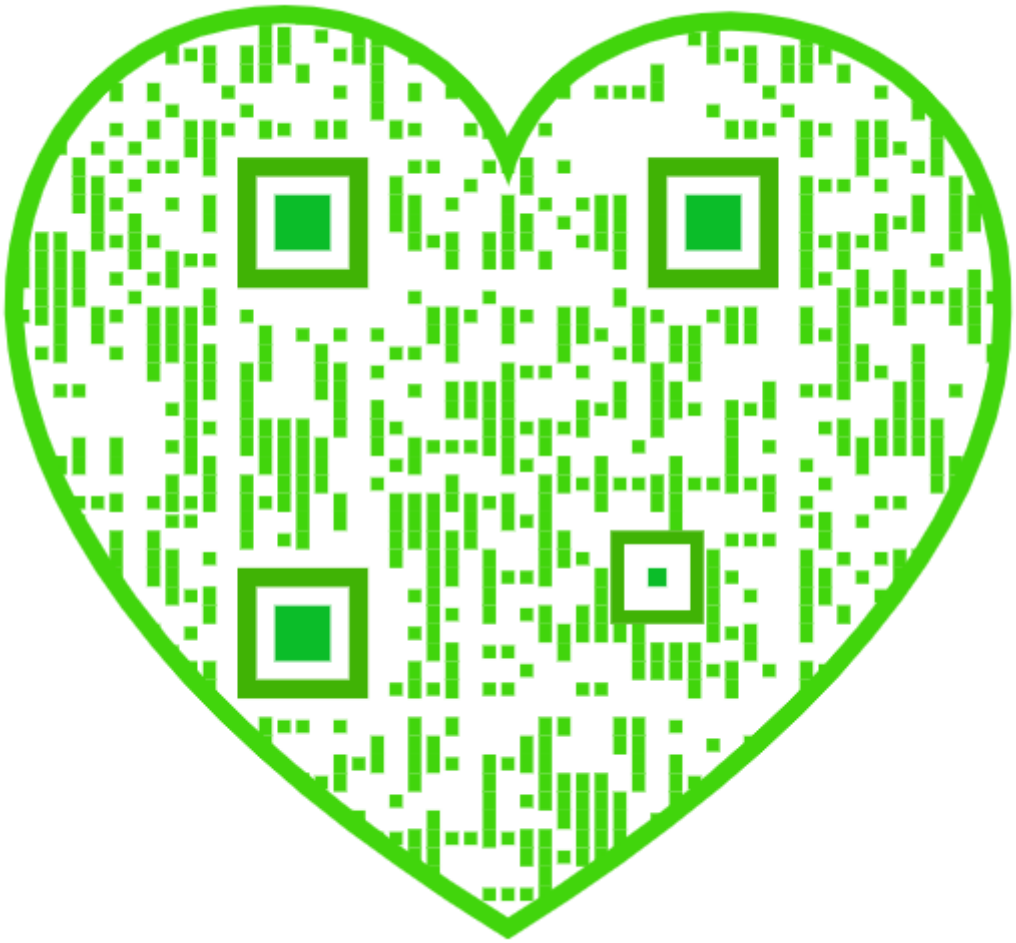

in solid water, unaffected by stern post, rudder, and the overhanging part of the stern, as in ships of the usual form. This feature secures an economy of power, or, what is the same thing, an increase of speed.

A vessel of this form will not roll and pitch as much as other vessels, as the body of water above the projecting part of the hull offers considerable resistance to such motions.

The rudders may be nearly balanced, and will require but little power to work them, and on account of the peculiar form of the stern, the rudders may have considerably less area than those of the common model, as it requires less power to move the stern laterally.

The form of the hull, while permitting very sharp entrance and run, affords ample room for the application of the greatest engine power compatible with carrying capacity. Two propellers, acting entirely independent of each other, will increase security against accidents to the machinery at sea, and the same may be said of the two rudders, which, although designed to be worked together by the same steering apparatus, may in case of necessity be worked separately. The arched form of the hull, with projecting sides below water, and the general absence of any plain surface exposed to the sea, admits of great strength of construction, and with suitable watertight compartments the vessel may be made exceedingly strong and safe.

The increasing width of the hull below as well as above the load water line gives great steadiness to the ship, so that it may be moved about even without load or ballast. This is owing to the fact that the metacenter rises with increased beam much more rapidly than the center of gravity.

The merits of this system are likely soon to be brought to a practical test, and it would be no surprise to those who have given the subject a careful investigation, if the efficiency of the system should prove greater than is indicated by the figures given.

Dangers of Phosphorus.

A series of investigations that have been published in several numbers of a German match journal has led to the following general conclusions:

1. The manufacture of matches from white phosphorus, owing to the unavoidable evolution of phosphorus vapors, is fraught with the gravest danger to the health and lives of the workmen.

2. The vapors of phosphorus, if breathed for a long time, produce general ill-health, under circumstances not yet fully understood, but which are probably to be sought for in the idiosyncrasies of the individual. Usually it takes the local form of necrosis of the maxillary or jaw bone.

3. The necrosis of the jaw, if not relieved in time by an operation, results in death.

4. The injurious constituents of the phosphorous vapors are neither phosphorous acid nor phosphoric acid, but *phosphorus itself*, free and uncombined, which passes into the blood as such, and probably circulates in the blood in the form of vapor, and from the blood acts upon special organs (liver, kidney, heart, stomach, and muscles) as well as on the bone tissues.

5. The most dangerous operations in making matches are making up the paste, dipping the splints, drying and packing the matches.

6. The manufacture of matches should only be permitted under the conditions that the phosphorous vapors shall be completely excluded from the work-rooms.

7. These conditions can be sufficiently complied with by energetic ventilation, and the use of a safety apparatus like those constructed by Beck & Henkel in Cassel. [The paper quoted does not inform us what this safety apparatus consists of.]

8. The absolute prohibition of the manufacture of matches from white phosphorus does not seem necessary from the sanitary police point of view.

Dr. Hahn, in a communication to the *Chemiker Zeitung*, makes the following comments to these conclusions: All the objections that have been made to the use of white phosphorus would deserve the fullest consideration if it was possible as yet to make *cheap* and easily inflammable matches without phosphorus. This, however, is not the case. Matches made of chlorate of potash, bichromate of potash, sulphur, and glue or gum, ignite only on a prepared surface covered with *red* phosphorus, gray antimony, pyrites, black oxide of manganese, and glass. The so-called "Swedish matches" fulfill the hygienic conditions of freedom from danger in manufacture perfectly, and are only in a slight degree explosive. In their manufacture the wood of the aspen tree must be used, and as this is very scarce in Germany, or has to be imported from Russia, they are about twice as expensive as the ordinary matches made of pine splints and hence have not found much favor among the people there.

But all inflammable mixtures made without the use of red phosphorus have the disadvantage of being *uncertain*, or difficult to ignite, and although theoreticians and some manufacturers that are trying to introduce such matches consider them a grand success, the public in general look on them as a grand failure.

Matches should, of course, never be made at home, where in addition to poor ventilation, the work-room must often serve as eating and sleeping room as well.

AN anvil cast in Pittsburg is supposed to be the heaviest casting made in this country. It is said 160 tons of iron was melted to pour it.

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A DUBIOUS AMENDMENT OF THE COPYRIGHT LAW.

At its last session Congress passed an act (approved August 1), which provides "That manufacturers of designs for moulded decorative articles, tiles, plaques, or articles of pottery or metal subject to copyright, may put the copyright mark prescribed by section forty-nine hundred and sixty-two of the Revised Statutes, and acts additional thereto, upon the back or bottom of such articles, or in such other place upon them as it has heretofore been usual for manufacturers of such articles to employ for the placing of manufacturers', merchants', and trade marks thereon."

This act is a model of ambiguity. The only thing certain about it is that it gives permission to put the copyright mark on the back or bottom of articles "subject to copyright." By implication it includes among articles subject to copyright moulded decorative articles, or designs therefor, hitherto protected only by design patents; but it does not say that such articles may now be copyrighted.

The purpose of the author of the bill was evidently to bring under the action of the laws of copyright a class of purely decorative objects not already subject to copyright, since they are *not* "models or designs intended to be perfected as works of the fine arts;" but the bill as draughted signally fails to do so.

The Librarian of Congress accordingly refuses to allow the registration of such purely decorative articles, for which no specific provision is made in this or previous statutes relating to copyrights, leaving them to be protected as heretofore by the law for design patents.

We are informed that the bill as enacted was introduced in the Senate by the patent committee, which properly had nothing to do with the subject; that neither the proper committee nor the Librarian of Congress ever heard of the bill until it was passed; and that the House acted upon it without due consideration and without referring it to the proper committee.

Thus it would appear that the manner in which the bill was passed was as loose as its grammatical and logical construction. As a law it is unintelligible, and only adds confusion to what was sufficiently confusing before.

NEW ANTISEPTICS FOR SURGICAL USE.

Certain inconveniences and disadvantages attending the use of carbolic acid spray in dressing wounds have led to a general search for acceptable substitutes. One of the most promising is the use of substances which are volatile as well as of antiseptic nature, such as eucalyptol, cajeput, terebene, and peppermint, by means of which a wound may be kept, if necessary, in an antiseptic atmosphere not merely while being dressed but at all times.

At the late annual meeting of the British Medical Association Mr. A. W. Mayo Robson described a series of experiments made by him to test the efficiency of atmospheres charged with such volatile antiseptics in preventing the development of life in putrescible fluids, the results being exceedingly encouraging. Flasks of sterilized hay infusion suspended in large, wide-mouthed, open jars, into which a little eucalyptus oil, cajeput oil, or the like, had been poured, remained clear, while flasks of the same infusion briefly exposed to ordinary air and then covered with cotton wool began to lose clearness and to scum over within a few hours. Altogether the results were thought to indicate that at ordinary temperatures air saturated with vapors of the class named was fatal to the germs of bacteria and micrococci, and probably also to the germs of fevers and other infectious diseases. As the vapors tested are not unpleasant or injurious when breathed, it is to be hoped that practical tests in hospital wards will confirm the promise of Mr. Robson's experiments. As eucalyptol—derived from the common eucalyptus—is abundant and cheap, it has been selected for further tests. Several surgeons have taken part in these tests, and the results are decidedly encouraging. When the vapor is used during surgical operations a bellows is employed to discharge air charged with it upon the spot exposed. The air is first drawn through a vessel filled with cotton wool, then through others filled with pumice stone over which a small quantity of eucalyptol has been poured. The emerging air is thus loaded with invisible particles of the antiseptic, which seems to be capable of destroying any vestiges of germ-life which may have been drawn in from the surrounding atmosphere. This is a pleasanter method than Lister's or the boroglyceride treatment of Professor Barff.

Not less promising is the turf-mould dressing of Dr. Neuber, of Kiel, the result of investigations of the antiseptic qualities of turf-mould made by him during the past two years. The fibrous and friable character of turf, and its lightness, softness, and elasticity, make this substance much neater and more comfortable than "dry earth" as a surgical dressing; and it seems also to have much greater antiseptic power. The mould, reduced to powder, is inclosed in bags of carbolized gauze, and simply bound upon the wound, which has previously been washed with a carbolic or other antiseptic lotion. This dressing has been used by Professor Esmarch in fifty-five cases, most of them severe operations, with wonderfully good results. In thirty-one cases there was no fever, and in only five cases was it necessary to remove the dressing, owing to either local or general disturbance. The chief advantages claimed for this dressing are its great absorbent power, its tendency to prevent the formation of putrefactive products; the easy adaptability of the turf pads to the surfaces of the body and limbs; and its cheapness, the cost being about one-ninth that of the Lister-

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ian dressings. For use in public hospitals and in private practice among the poor, the element of economy is a very important one.

Another great advantage, if the apparent virtues of turf mould are confirmed by wide experience, will arise from the circumstance that it is everywhere obtainable. Dr. Neuber's attention was drawn to its possible merits by the appearance in the clinic of Professor Esmarch of a patient who reported that his arm had been badly hurt eight or ten days before while he was at work upon a moor. The injured arm had been simply covered with mould and protected by a rude wooden splint. The patient appeared to be in good general health. When the primitive dressing was removed the surgeons were astonished to find that with an extensive laceration of the soft parts of the arm, a rupture of the wrist joint, and a fracture of both bones of the fore arm, the wound was free from suppuration—in some parts already united by first intention, in others granulating in a satisfactory manner. The physical condition of the patient and the purity of the country air may have contributed somewhat to the healthy condition of the seemingly neglected wound; but, as subsequent trials proved, the main protection came from the antiseptic mould; a dressing most easily obtained where other antiseptics are to be had with difficulty. Country practitioners and workmen on railways and other works away from surgeons and surgical appliances will do well to bear this fact in mind. Of course care must be exercised in selecting turf-mould for such purposes from spots not likely to be subject to local contaminations, else it might serve to introduce the very germ which it is sought to avoid and exclude.

SEWING MACHINES IN GERMANY.

In a long communication from Berlin a correspondent of the *Sewing Machine Journal* sets forth very clearly the reason why the introduction of improved sewing machines of American manufacture has been so difficult in Germany. After describing the failure of several companies to work up a German market for their machines by a liberal distribution of samples, by establishing local agents, and so on, he attributes the failure mainly to the high prices asked for American machines. Even where the American machines are far superior to German imitations the preference is given to the cheaper machines. "The production of sewing machines in America is attended with more expense than in Germany, owing to higher wages; to which must be added freights, duties, shipping expenses, and commissions to agents. These increase the cost of American made machines in this market considerably. Germany is producing sewing machines more cheaply than any other country on the globe; and the quality of German machines has been greatly improved in the last ten years. German machines are provided with all the modern improvements, such as loose pulley, automatic bobbin winder, shuttle ejector, tension liberator, etc.; while most of the old American companies refuse to introduce those essential improvements on their machines. In consequence of this fact German machines are very often preferred. For instance the Wheeler & Wilson machines still have the bobbin winder on the stand under the table. For this reason some dealers do not want them.

"Another reason why American manufacturers cannot so easily gain a foothold in this country is the very close relations existing between the dealers and manufacturers here. The dealers are frequently financially dependent upon the manufacturers, and are too frequently visited by their travelers, etc. These are circumstances which the American manufacturers cannot so easily overcome."

To meet this difficulty the way suggested is for American manufacturers to "branch out," as the Singer Company has done. The only competitor who has made himself felt by the German manufacturers is the general agent of this company, whose success is attributed to their method of disposing of machines in a way to create a demand among consumers, thus compelling local dealers to supply them.

Another fact of importance to American manufacturers is the promptness with which their machines are imitated in Germany as soon as a regular demand has been created, unless the machines are fully protected by patents. These imitation machines are sold at exceedingly low rates, for example the German machines of the Singer pattern are sold in Berlin at from ten to twelve dollars, wholesale, complete machines with all improvements.

Hops and Hop Growing in New York.

The hop growing region of New York embraces parts of Schoharie, Otsego, Herkimer, Oneida, and Madison counties. The extent of the industry and the manner in which the gathering of the hops is effected are well described by a correspondent of the *Evening Post*, "H. D. C.," in a letter from West Winfield.

It will be noticed by inventors that hop picking machines are as yet but little used, though promising experiments have been made in this direction. The field for invention here is a wide one and well worth cultivating.

The principal gateways to the hop region at present are the junction of the Cooperstown Railroad with the Albany and Susquehanna and the city of Utica. From these points hundreds of men, women, and children are now daily hurrying to the hop fields. It requires a good deal of skill and experience on the part of growers to manage these people so as to get the work done with as little waste of time and product as possible. Strikes are not uncommon at the most critical period of the hop picking season. When these occur the grower is apt to accede to the terms of the pickers, because a few days or a week's delay may endanger all the hops he has still on the poles. The hop picking season has a cheerful side also. The occupation is healthful, and many go to the smaller and more retired fields to pick for their health. The open air, the pungent aroma of the hops, and the useful exercise excite digestion and give the picker an appetite which he or she needs as a prerequisite to invigorated physical condition. Before the picking season closes the young people have their dances and their frolics, which partake of the mixed character of country and city ways and manners.

WAGES.

The work of the pickers is done "by the piece," the unit of labor being the box. A field of good pickers will average two boxes a day each, though some who turn a deaf ear to the gossip of the yard and attend strictly to business may fill three and even four boxes. The four-box picker is not usually as highly esteemed by the grower as a slower one, for the reason that he is apt to have his pickings too liberally mixed with leaves and stems. The picker's pay averages fifty cents a box. The larger grower sometimes offers as high as seventy-five cents, in order to secure his crop before it can be injured by frost or the equinoctial storms. Except in the small yards that are picked by help from the immediate neighborhood, provision is made for boarding and lodging the pickers on the farm where they are employed. The price of board is placed at the lowest possible figure, and is deducted from the pay on settling day. The picker's account is kept by checks, one being given for a box or a given number of boxes. These are exchanged for larger ones, and when the poles are all stripped the checks are redeemed in cash. The boxes are constructed in groups of four. Each picker usually fills his own box, but it is not uncommon for two or three persons to join forces and to divide the earnings. A mother and two children are often found picking in one box. Many women take their little children to the field, receiving such assistance as the older ones can render, while the smaller ones play in the dirt till they are tired and then go to sleep on the hop sacks or under the shade of neighboring bushes. Besides the pickers who are paid by the box, "tenders" are employed by the day, whose business it is to pull the poles, to strip off the vines, and to deposit the latter convenient to the picker's hand.

USE OF MACHINERY.

Within a few years several experiments have been made in the southern part of Oneida county with hop-picking machines, but no substantial success has yet been achieved. An improved machine now at work in a large yard near this village was observed by the writer a few days ago. It is a simple contrivance, which the patentee, who was operating it, acknowledged to be as yet in an imperfect and experimental state. It consists of a set of small rollers geared upon bearings which separate or draw close together by means of spiral springs. The hop vine is cut from the poles in pieces, and is fed between the rollers, butt end first. The vine and leaves pass between the rollers, but the hops break off in front of the rollers, drop down upon a receiver, and are carried to a table where two persons are kept busy picking out the leaves that may follow the course of the hops. The machine operates somewhat like the common clothes wringer, the hops, being more bulky than the vines and the leaves, breaking off when they come to the rollers, as a shirt-button is torn from its fastening while the shirt passes smoothly between the rollers which press the moisture from it. Last year this hop-picking machine was operated by foot power, the man who fed in the vines also plying a foot treadle as a motive-power. The patentee has this year geared his machine to power, which is operated by a sheep. The power is the common treadmill used by farmers who do their churning by dog or sheep power. When the writer saw this hop-picking machine in operation it was run by a medium-sized, mild-eyed ewe, whose plaintive bleat now and then pleaded to be released from the endless up-hill journey. Near by two other wool-bearers were tethered waiting their turn on the treadmill. By thus changing sheep frequently the three are able to keep the picking machine running throughout the day. To operate the machine to its full capacity requires two persons to fetch the vines from the poles, one to feed, and two to pick out the leaves that drop down among the hops. The machine does its work so well that it promises to come into general use as soon as it can be made to do more than it now does. The five persons who are required to attend it could pick nearly as many hops as the machine does.

THIS YEAR'S CROP.

The crop this year is considerably below that of last year. In Otsego county the estimate is two-thirds; while in Herkimer, Oneida, and Madison growers expect three-fourths of last year's yield. The price, however, is so strong that growers are feeling in the best of spirits. No one thinks of selling for less than fifty cents, while the expectation is for considerably more than this. As it is estimated that ten cents a pound is the average cost of production, the hop-growers this year are in a fair way to make money.

General average for seventeen years 34⅓c. nearly.

The total acreage of hops in this country in 1879 was 46,808, of which this State had 39,072. Of the total production of 26,583,314 pounds this State furnished 21,663,131 pounds. Wisconsin produced 1,966,427 pounds. Statistics show that while the New York yield increased in ten years from 17,000,000 pounds to 21,000,000, that of Wisconsin decreased from 4,000,000 to about 2,000,000.

The soil of California seems to be the best adapted of any in the United States, so far as experiments have been made, for raising hops, the yield per acre being 1,274 pounds. At the prices prevailing this year the hop farmer of the Pacific slope will thus earn $637 per acre, or several times the price of his land.

The hop industry of this State, and in fact of this country, is of comparatively recent origin. The first vines in America were planted by James D. Cooledge, in the town of Madison, Madison county, seventy-four years ago. Forty years ago there were raised in this State only 2,236 bales. The counties which now lead in this industry have always led; but it looks as if the seat of the hop empire would in a few years be transferred from Otsego county to Oneida. Hops and cheese have an affinity which induces them to remain close neighbors. The hop vine requires rich soil, and an abundance of fertilizer on soil that is naturally thin and weak. The dairies furnish much of the fertilizer used in the hop-yards throughout this part of the State, where cheese-making and hop-growing are almost the only sources of income to the farmers.

New York Academy of Sciences.

The Geological section of the Academy of Sciences met at their rooms, 12 West 31st Street, Monday evening, Oct. 9. Dr. J. S. Newberry president, in the chair. Mr. Chamberlain exhibited some beautiful specimens of hiddenite from North Carolina. Mr. Geo. F. Kuntz exhibited fine crystals of apatite from Rideau, Canada, also large plates of phlogopite (mica) which exhibited a very interesting property, viz.: when held between the eye and a gas light, six rays were seen to extend from the light at angles of 60° from each other, each ray being made up of a series of short parallel bright lines very close together. Mr. F. Cope Whitehouse exhibited, by means of a lantern, a large number of views of the caves on the Island of Staffa, the most interesting being the famous Fingal's Cave. After fully describing their form, size, etc., Mr. W. stated his belief that they were not, as generally supposed, produced by natural causes, but are artificial caves made by the hand of man at some very early period. Among other reasons given for this conclusion were the following: The high and pointed roof of Fingal's Cave, resembling the roof of a Gothic church, whereas natural caves have a low and flatly arched roof; the caves of Staffa are protected by breakwaters, or other barriers, from the force of the waves of the Atlantic, which could hardly have excavated caves of such depths at a few points; some of the caves are twelve times as deep as they are wide, with straight sides; the basaltic columns do not crumble nor form shingle, yet none of their remains are found near the mouth of Fingal's Cave, hence they must have been carried away by man to a great distance, probably to Scotland. Some discussion followed the reading of the paper by Prof. Day and others, showing that the members of the Academy were scarcely prepared to accept the conclusions of Mr. Whitehouse.

The Comet and the Moon in Arizona.

A correspondent who resides at a mining camp on the mountains in the south-eastern corner of Arizona, says that the great comet comes into view there about three o'clock every morning, presenting a wonderful spectacle, remaining visible until after the full sunrise.

The brilliancy of the moonlight at this elevated station is such that mountains seventy miles distant are seen.

Improved Mortar.

Sawdust is said by some one to be better than hair in protecting rough cast from peeling and scaling under the influence of frost and weather. The sawdust should be first dried and then thoroughly sifted, in order to remove the coarser particles. A mixture is then made of two parts sawdust, five parts sharp sand, and one part cement, which should be thoroughly stirred together and then incorporated with two parts of lime.

ON the authority of a Pittsburg paper there are fifty-one completed rolling mills and steel works in Pittsburg and Allegheny county, and two building. Of these, eight are rail mills, six making only light rails, twelve are crucible steel works, one makes cemented steel only, three are Bessemer steel works, seven are open-hearth steel works, and one open-hearth steel works is building. Besides these are several other iron and steel works located outside of the county, but owned in Pittsburg.

WHAT a learned physician of New Albany, Ind., pronounced to be a cancer in a boy's throat was discovered by the mother of the child to be caused by a beard of wheat three inches long and containing eight grains of the cereal.

PEARL fishing is pursued by no less than 1,000 divers on the coast of Lower California. The pearl oysters are found from one to six miles from shore, in water from one to twenty-one fathoms deep. The yearly product is about $500,000.

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A NEW SMELTING FURNACE.

The remarkable increase within the last few years in the production of argentiferous lead in connection with the great commercial success of the operations as exemplified at Leadville, Colorado; Horn Silver Mining Company, Utah; Eureka and Richmond Consolidated, Nevada; and numerous other almost equally great enterprises, has naturally stimulated improvement of methods of reduction. The new smelting furnace, manufactured by the Lane & Bodley Company, Cincinnati, possesses several features that we think of sufficient importance to describe in this article.

Whenever the use of cast iron has heretofore been objectionable on account of liability to breakage from unequal expansion or other cause, wrought iron has been substituted; also in other places where the use of cast iron resulted in great weight, a similar substitution of wrought metal has been resorted to, thus producing a furnace of maximum strength and durability with minimum weight.

The ground plan of the crucible binders is that of a rectangle with the corners chipped off, thus allowing the upright supports of the deck-plate to be entirely independent of the masonry within the binders. The uprights are wrought iron I beams in lieu of the usual cast iron columns, thus avoiding weight, securing more room, and the flanges on the sides forming excellent racks for supporting bars and other implements used about the furnace.

The usual troublesome cast iron deck-plate is superseded by I beams, the space between them being utilized as a channel to conduct off the noxious gases and fumes that escape to a greater or less extent from all furnaces, owing to the pressure within, due to the blast pressure; from the channel above mentioned are flues to conduct the gases, etc., to the outside of the stack building.

At the feed door is a ledge a few inches high, thereby requiring the feeder to throw the charges over it into the furnaces, thus preventing the charges being shoved in, and the fine materials all falling in on one side of the furnace.

The space between the crucible and deck plate can be filled with brick and water tuyeres or spray jackets, or water jackets of cast iron, wrought iron, or steel, with closed or open tops; the engraving represents open top steel jackets. Jackets of this construction have been thoroughly tested at the large new smelter of the Horn Silver Mining Company near Salt Lake City, Utah, and proved to be the most economical, although of somewhat higher original cost, than other forms of jackets. These jackets are constructed by forming the sheet next to the fire into a box six inches deep, the corners being shaped up without cutting, welding, or riveting (the back is formed by a shallow box fitting into the deep one), resulting in a presentation of no welded or riveted joint to the action of the fire, excepting where the bronze metal tuyere thimble is secured by countersunk rivets to the inside sheet of the jacket, and from which no trouble has resulted, owing to precautions taken in the details of construction.

The end jackets do not run down to the crucible, the spaces so left being closed by small jackets with the tap hole through them; these small jackets can readily be removed without disturbing the main end jackets, in cases of necessity admitting the introduction of a bar without "running down the furnace."

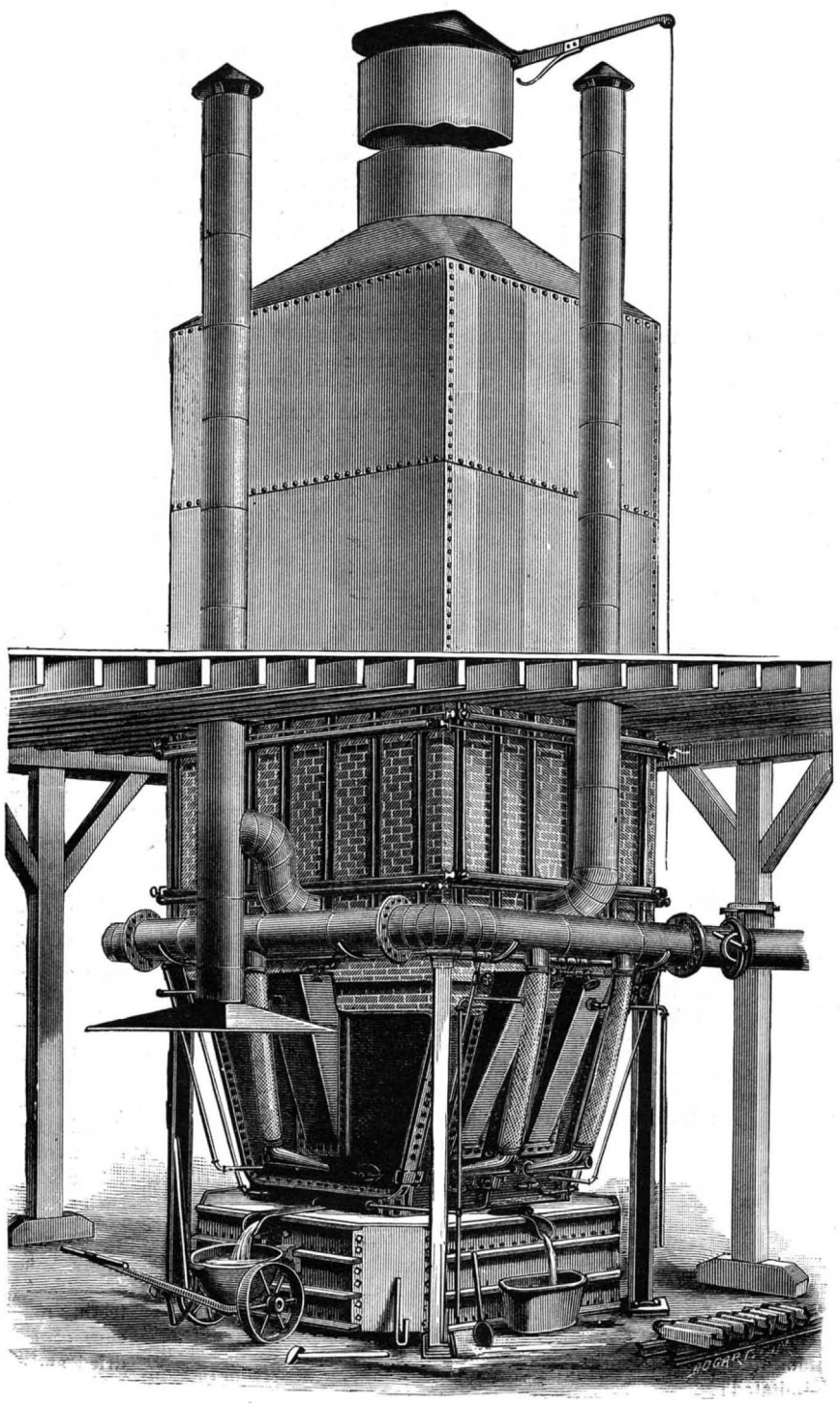
One of the most fruitful sources of annoyance about furnaces is the blast and water pipes; in this furnace the details of these pipes have received great care. The blast pipes do not interfere with putting in or removing jackets, and they are out of the way of water pipes, permitting of readily repairing the same. The blast pipes are not in the way in bricking up from top of jackets to deck-plate. All the water pipes are readily accessible for repairs, and the water pipe valves are within easy reach of the furnaceman, yet out of the way in working around the furnace. The water pipes and valves are so arranged as to admit of removal, and repair of any jacket without disturbing the water supply, or connections of other jackets.

There is frequently considerable trouble in keeping jackets properly cool, when first starting, upon account of their not being protected with a layer of chilled slag; this trouble is found to be entirely overcome by the use of an auxiliary supply, obtained through the connection to the blow-off hole in each jacket, which supply is only used under the circumstances above indicated.

The brace under the slag spout is notched in steps for the purpose of catching the edge of slag pots, thus holding them level without putting a block under the foot of the pot carriage; such blocks being a source of annoyance, as the slag pot wheels frequently strike them, causing the hot slag to be spilt.

Frequent reference has been made to details, as they are an indication as to the convenience in the practical operating of any device.

In this furnace the maximum strength and durability with minimum weight are secured, and there is no piece but admits of ready transportation. The total weight is very small, consequently cost of transportation small. There are no cast iron parts liable to break, and all parts are readily removable for repairs. The escaping noxious gases and vapors are carried off. The forms of all essential parts have been approved in practical working.



SMELTING FURNACE MANUFACTURED BY THE LANE & BODLEY COMPANY, CINCINNATI.

Magazine Guns.

The Board of Army Officers designated to examine into the merits of the different magazine guns have just concluded their report and transmitted it to the Secretary of War. The tests of the different guns were commenced in the early part of July, 1881, and included every magazine rifle brought before the Board.

The Lee gun, No. 36, the Chaffee-Reece, No. 33, and the new Hotchkiss, No. 34, representing the different systems of the detachable and fixed magazines, passed these tests in a satisfactory manner, possessing in a remarkable degree efficiency as single loaders, safety, ease of loading, rapidity of fire, endurance, moderate weight, and simplicity of construction. The Board, therefore, regard them as suitable for the military service, and recommend them in the order named.

On account of the novel and meritorious features of the Spencer-Lee, No. 35, and its record made before the Board especially for rapidity with accuracy, it is recommended that the manufacturers be invited to produce models embodying suggestions of the Board as to weight, etc., and to submit them to the War Department with a view to the trial of a limited number in service.

TRADITION says that beer was first made at Pelusium, on the Nile, 400 B. C.; but nowadays only a crude kind of barley beer is made by the natives in Egypt. There is, however, a brewery in Cairo, owned by a Geneva company, and worked on the German system, which can turn out 400 barrels a week.

Oxygen from the Air.

A method of obtaining oxygen from air, for technical purposes, has been recently devised by M. Margis, of Paris. The principle is that of dialysis, or diffusion under pressure. Atmospheric air being forced against a first caoutchouc membrane by suction, a mixture of about 40 per cent of oxygen and 60 per cent of nitrogen is obtained on the other side. A second membrane increases the proportion of oxygen to 60 per cent; that of the nitrogen being reduced to 40. A third gives 80 per cent of oxygen; a fourth, 95 per cent. M. Margis prepares his membranes by immersing taffeta in a solution containing sulphide of carbon (or light petroleum ether), spirit of wine, ether, and caoutchouc. After drying, the taffeta has a fine layer of caoutchouc on it.

A bag of the membrane, with a framework of rings of galvanized iron wire, is placed in a cylindrical iron vessel admitting air. It is connected by means of strengthened caoutchouc tube with the suction pparatus, which is (preferably) formed of a cylinder containing a series of conical cups with small spaces between. Steam is forced through these, and draws in the gas obtained from the first diffusion, passing on with it through a cooler, where the steam is condensed and the gas separated for its second diffusion. This latter occurs through a similar apparatus, except that the space round the bag is provided with a tube passing down into water. The pressure can thus be regulated, and the superfluous gas let off. Four sets of the apparatus are generally used (as already indicated), and the final gas with 95 per cent of oxygen is collected in a holder. Even the mixture obtained from the first dialysis is strong enough to considerably increase the luminous power of a gas holding hydrocarbons, M. Margis says as much as tenfold.

Parisian Real Estate.

It is calculated that no less than eleven hundred dwelling houses are now being constructed in Paris. In order to realize what this means, attempts at comparison with English houses must be put aside, for by far the greater part of these new buildings are of immense size—what the French call *maisons de rapport—i. e.*, destined to be let out in suites of apartments, each of which is a complete dwelling in itself, so that the average number of inhabitants per building will be at least ten times greater than that sheltered by London houses. Notwithstanding this abnormal activity in the building trade, which has, moreover, continued for upward of three years, the value of house property is rising every day. Taking at random a few instances from a list of recent sales in the French metropolis, we find that No. 62 Boulevard Malesherbes has just realized 1,200,050 fr.; No. 64, 1,030,000 fr.; the private residence of M. Secretan-Overnay, 59 Rue de Ponthieu, 1,500,000 fr.; and that of the Comte d'Haussonville, 35 and 37 Rue Saint Dominique, 2,900,000 fr.—*The Architect.*

The London Fisheries Exhibition.

The prospects of the International Fisheries Exhibition in London, next year, as indicated by a report of the Executive Committee just issued, are exceedingly bright. Applications for space have been received from all parts of the world, and the expectation is that the successful exhibition at Berlin will be surpassed.

The exhibition area will cover about 250,000 square feet. A prize of $500 is offered for the best essay on catching and distributing sea fish, and another, also of $500, for the best essay on the food of fish; while the best lifeboat exhibited will carry off the fine gift of $3,000. Among the other money prizes are four, offered by Ashmead Bartlett Burdett-Coutts for the best collections of fishing rods; a prize of $100, given by the Baroness Burdett-Coutts, for the best plan of a fish market; and a prize of $300 for the best model of a carrier boat, the boat to be specially adapted for preserving the lives of her crew. The English Government will strike medals at the Mint as rewards of merit, will issue diplomas of honor, and will probably make a grant of public money toward the expenses of the exhibition.

Vegetable Butter.

N. Jepson, an English vegetarian, not wishing to use poor and adulterated animal fats, has sought a substitute, and found it in a composition for which the following is the formula: Take four ounces of the finest Brazilian nuts, pounded very fine in a mortar; four ounces pure olive oil; rub them into a smooth jelly; add eight ounces of fine wheat flour and a quarter of an ounce of salt. Rub the whole into a smooth paste, and use as butter. This would certainly be preferable to much that goes by the name of butter.

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The Ames Monument.

To commemorate the services of Oliver and Oakes Ames in connection with the building of the first railway across the United States, connecting the Atlantic with the Pacific, the Union Pacific Company are erecting a granite pyramid on the highest point near its track. The monument is now nearly finished. It is 60 feet square at the base and 60 feet high, laid up in undressed red granite, in a style calculated to last for centuries. On the west side is a medallion bust of Oakes Ames, 9 feet high, with the date of his birth and death. On the north is the inscription: "In memory of Oakes Ames and Oliver Ames." On the east side the bust of Oliver Ames has yet to be placed. The top is rounded off, and does not make an acute angle. The cost is said to be nearly $90,000.

A Curious Tree.

Lieutenant Houghton, who has recently visited New Guinea and several other groups of islands in the Pacific, reports the existence of a prehensile tree. It appears to be a species of ficus, allied to the well-known banyan-tree, which throws out from its branches air roots, that eventually reach the ground, and take root there, and in their turn become new stems, which perform the same function; so that a single tree will eventually extend so far as to form a complete forest, in which the stems are united by the branches to each other. The prehensile tree in question similarly throws out from its branches long, flexible tendrils, which, touching the ground, do not take root there, but twine around any article that may lie within their reach. After a time these *quasi* branches contract, so that they fail to reach the ground; but the finger-like processes continue to closely gripe the article round which they have twined themselves, and which are consequently suspended in mid-air. In this way, articles of considerable weight may be literally picked up from the ground and held in suspension.

Aluminum.

At the reeent meeting of the British Association, Mr. Barlow read a paper "On the Mechanical Properties of Aluminum." This metal is used chiefly as a substitute for silver, but the author had found it to be exceedingly strong in proportion to its weight. Experiments had been carefully made for him by Prof. Kennedy, from which its valuable properties of ductility, tensile strength, and elasticity were fully demonstrated. This was well illustrated by the comparative length of rods of uniform section, but of different metals, which could be suspended without rupture, the lengths in the case of steel and aluminum being equal and exceeding all others. Unfortunately it is an expensive metal, and the process by which it is at present extracted leaves little hope of its use being greatly extended. Sir H. Bessemer said he did not think any metal could be depended on like the one in question, from the small part its weight took in producing its rupture. He exhibited a key of the material (about the size of a large latch key), and it was stated that forty-five of these would only weigh one pound.

OBSERVATIONS upon Russian railways have resulted in showing that for the period of six months 77 per cent of the fractures of tires occurred when the temperature was below zero, 4 per cent at zero, and only 19 per cent at higher temperatures.

IMPROVED CIRCULAR SAW MILL.

We present an engraving of a circular saw mill lately introduced by the Taylor Manufacturing Company, of Westminster, Md. Circular saw mills have, to a certain extent, displaced the reciprocating mills, and are now chiefly used in the manufacture of lumber. The improvements made in saws in the last few years have done much toward bringing the circular mill into popular favor. To keep pace with these and other improvements, and to more perfectly meet the wants of saw mill men, the mill illustrated has been designed.

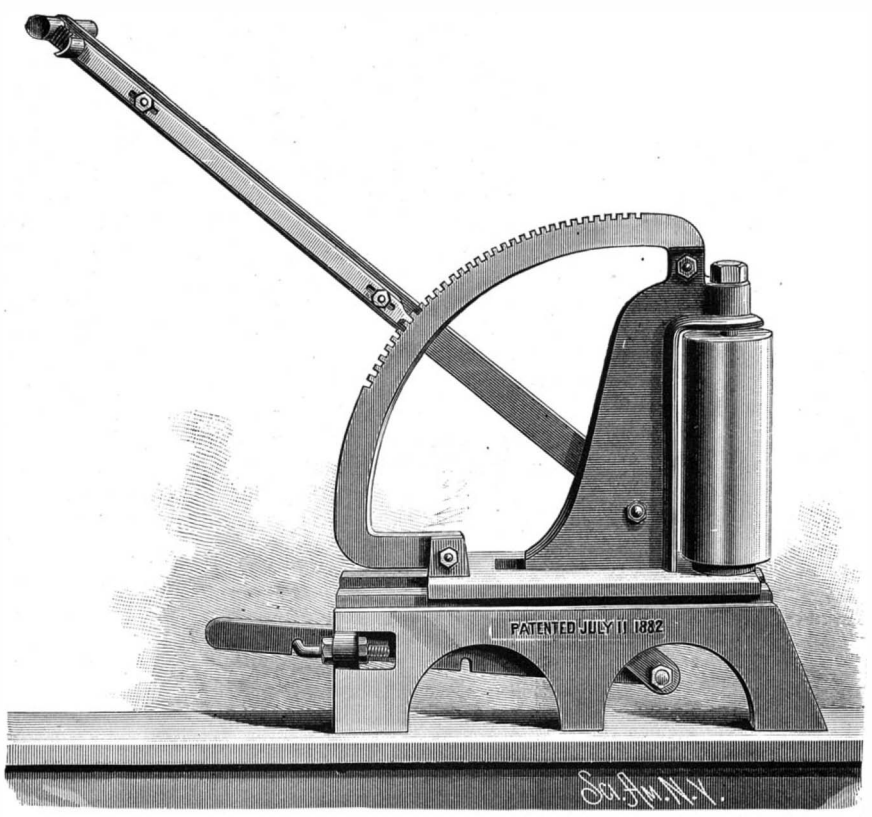

Fig. 1.—GAUGE ROLLER.

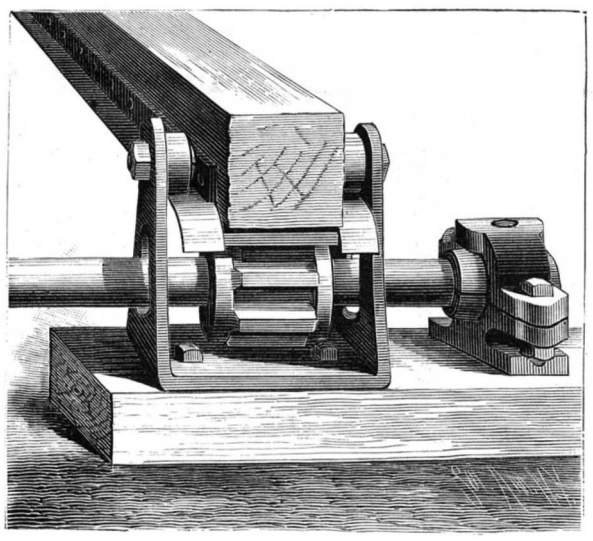

Fig. 3.—EXTENSION GUIDE.

There is probably no machine made by which purchasers are in so great danger of being misled by appearances as in circular saw mills. The chances for deception are numerous; circular saw mills cut so much faster than old fashioned sash or muley mills, that they seem to be doing wonders, and are liable to deceive those who are not familiar enough with the subject to know how much a mill should do. They work very fast, and when the stuff is badly sawed, as is invariably the case when a mill is built regardless of quality, so that it can be sold at a low price, the loss is very great.

The object of the manufacturers in designing this mill is to furnish the machine at a fair price, and at the same time present entirely new valuable features in construction and design. The main frame is of cast iron, of girder shape; it is well proportioned for strength, and being cast in one piece cannot spring out of line. The mandrel is made of steel, and of large diameter so as not to spring. The mandrel boxes are self-oiling, and have large bearing surfaces; they are provided with an ingenious device for giving lead to the saw. The feed and the backward motion of the carriage are operated by friction, thus doing away with belts and complicated gearing. There are three fixed changes of feed operated by one lever, and the feed can be varied or stopped instantly by a slight movement of the lever. The gigging back is controlled by the same lever, and can be speeded slow or as fast as seven hundred feet per minute. This rapid gigging back saves much time, and is secured without any injurious jar on the machinery, as the movement of the carriage is gradual to its fastest speed. A rapid movement for setting up the log to the saw is secured by the combined gear for moving up the head block, and a novel quick-acting accurate gauge roller. This gauge roller, shown in Fig. 1, is placed on the end of the frame in front of the saw and at the feed lever where the sawyer stands, thus being convenient to his hand. The roller is operated by one lever to set it in position, and the lever is held in place by a latch in notches cut in an arc, as shown in the engraving. These notches are marked in one-quarter inches, and serve as a rule to saw by, so that the sawyer only has to set the roller, and an attendant who rides on the carriage brings the log up to the gauge-roller, while the carriage is moving toward the saw, and the result is the lumber is sure to be straight, and of whatever thickness the roller is set for. The connections of the lever to the gauge roller are provided with an adjustable link, by means of which all lost motion of parts connecting the roller and the lever can be corrected and the roller always kept true to the saw and the figures on the notched arc. This adjustment can also be used for setting the roller to any fraction less than a quarter inch; for instance, for lumber that is one inch full, or one inch and an eighth, and so on, it is only the work of a few minutes to set the roller for it. This gauge roller is an entirely new feature, and has been patented. It is very important on any saw mill, and is applicable to all mills.

Another very important feature of this mill is a continuous log beam in combination with a main head block for dogging the log. This log beam extends the whole length of the carriage, and is arranged every eighteen inches of its length with fending blocks that are dovetailed into the beam as shown. The blocks virtually serve as head block knees in keeping the lumber to the saw and prevent its springing, and the face of these blocks can be trued in perfect line with the saw by taking a cut-off of them after the mill and carriage has been set in position, and it may be kept true by same means, and when worn out can be replaced. It can readily be seen that the lumber, by having to pass between these blocks, and the gauge roller and the

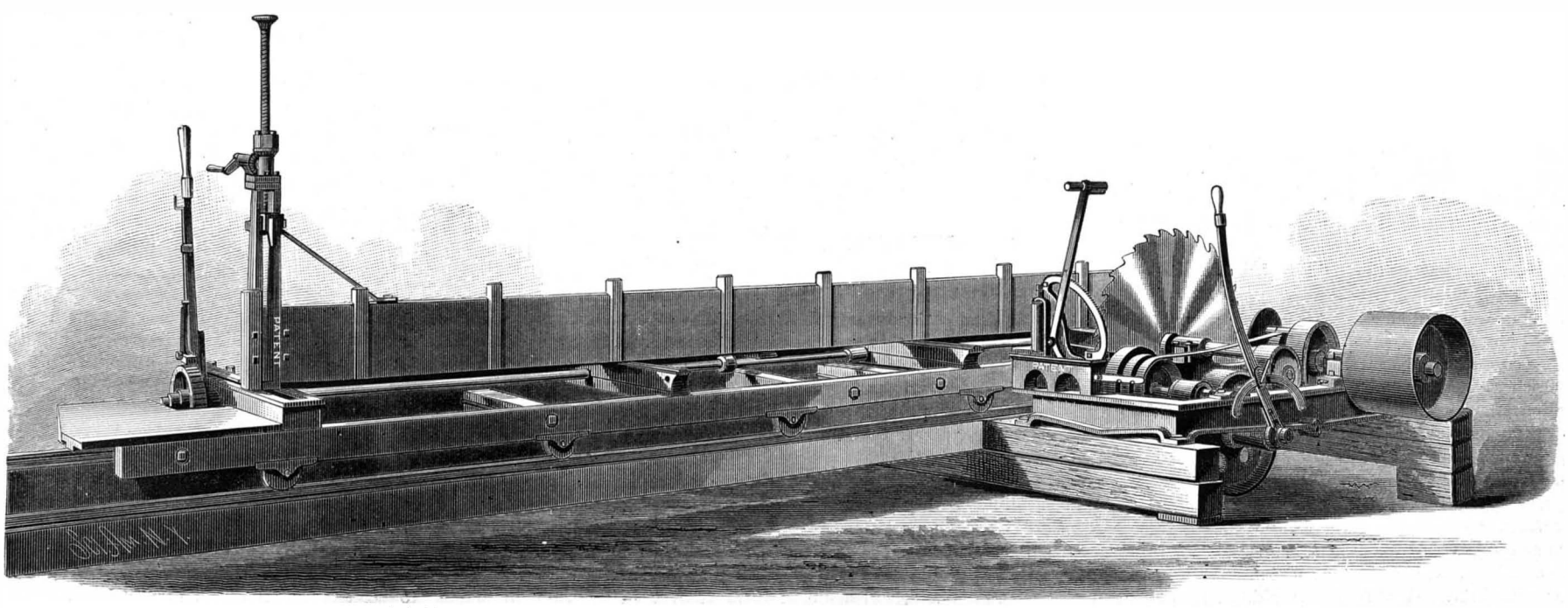

Fig. 4.—NEW CIRCULAR SAW MILL MADE BY THE TAYLOR MANUFACTURING COMPANY.

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face of the blocks being true to the saw, straight and even lumber only can be produced, it being impossible, if the saw is in proper order, to saw bad lumber. This is a novel and important feature.

The log beam is made of three pieces, in box form, and is very rigid. It is secured to the elbows of the head blocks, three of which go with twenty-four feet of carriage, and two short elbows that fit into back of log beam, and one main dogging block at end of beam, as shown in cut. Combined in the elbow of this main block is an ingenious device for dogging or holding the log in place on the carriage. This dog is the only one needed on the carriage, it is very complete, and being part of the head block proper is very rigid and strong. The dog is arranged in a cross-head that slides up or down in the elbow; through this cross-head the dog can be made to project so as to fasten well out on a rough log while it is being slabbed, or it may be set for holding the last board one inch thick. It is held securely in place by means of a clamping device, and cannot come in contact with the saw. The cross-head and dog are operated by a long screw that is threaded its entire length, and engages two half nuts that may be opened and closed, and by which the screw and dog are held suspended at any point, or released, and when dog is lifted to the top of elbow out of the way of log as it is rolled into the head blocks by releasing the two nuts the cross-head dog and long screw will drop down, and the weight of all together will force the dog into the log sufficient to hold, and if it does not the nuts can be engaged into the screw, and by turning the handle shown at top of elbow, the dog can be forced into the log as far as desired, and by the turning of the same crank the dog can be pulled out of the log, and when out of the log can be drawn quickly to top of elbow by releasing the nuts and lifting by the end of the screw that projects out of the top of elbow. This whole movement is very rapid, and is accomplished by a man riding on the carriage. The dogging and setting up of the log can be done while the carriage is in motion, and according to directions given by the sawyer. It is evident that by such arrangements the saw can be kept in the log a greater proportion of the time than with other mills where the sawyer sets up the logs and must stop the carriage to do so. A detail view of the main dogging block is given in Fig. 2.

A plain lever with simple ratchet arrangement is used for moving the elbows of head blocks. A figured rule is also arranged on the main head block, so that the man at the head block can keep tally with the gauge roller and also use it for slabbing. The shaft connecting the head blocks is of large diameter, so as not to spring nor twist in bringing up the log. The carriage is strong and well braced and held together by iron rods and extensions at each end, eight feet long, which allows a log to be sawed full length of the carriage; on each side of extensions there are guides, Fig. 3, that run in rollers and prevent the rack on the extensions from springing out of the pinion and tearing off the cogs. This allows of the sawing of pieces 10 feet longer than the carriage. It is an improvement peculiar to this mill, and any one familiar with mills will understand the importance of it. The rack is wide on the face, and cogs are large and strong. The rollers under the carriage are of large diameter and strong, one being flat and the other being flanged on both sides so as to run over a regular T rail, same as used on railroads, which runs easier and less wear than the V-shaped track used by other builders, and the track being high is comparatively free from being covered with sawdust.

The company build five sizes of circular saw mills; the mill shown in Fig. 4 being their No. 3 mill, or medium size. No. 5 mill, called the plantation mill, is the smallest size. No. 1 is their largest mill, suitable for heavy engines, and built to stand the heaviest kind of work; feed belt is six inches wide, and feed of carriage to saw three and four inches.

For further particulars address Taylor Manufacturing Company, Westminster, Md.

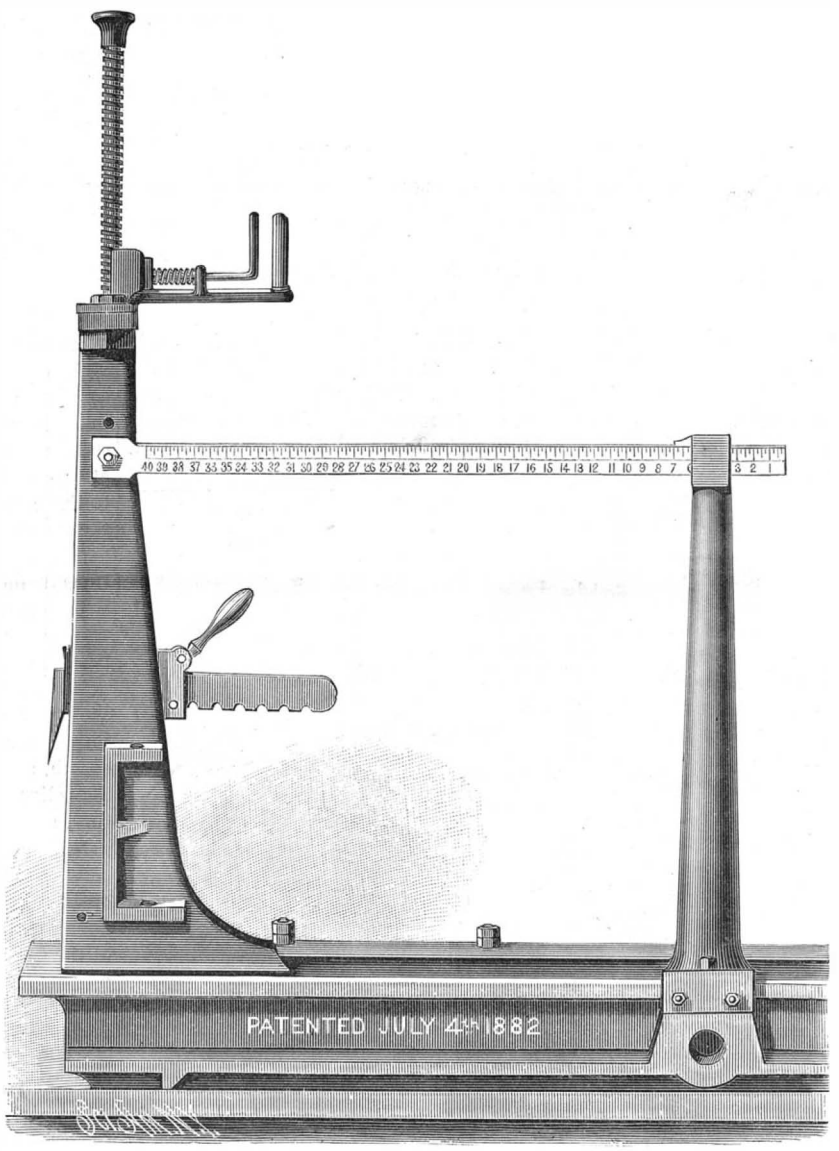

Fig. 2.—HEAD BLOCK.

Enameled Cloth.

As a substitute for leather, enameled cloth is now largely used where lightness and pliableness are desirable. Having the appearance of leather, and nearly, if not quite, its durability, it is used where strength is not so important as a good appearance. In the covering of carriage tops, the upholstering of furniture, the covering of trunks and traveling bags, a great quantity is used, and it is also employed in garments, coverings, etc., as a protection from water. Enameled cloth originated in America, and was first made at Newark, N. J., in 1849. The details of its manufacture are very simple, and can soon be told. The foundation of the article is cotton cloth of the best quality, and generally made expressly for this purpose. The cloth is taken from a bale and wound upon a large cylinder preparatory to receiving its first coat. It is then passed between heavy iron rollers, from the top one of which it receives its first coating of composition. In many places the covering is spread by a knife under which the web passes. The composition is made of linseed oil, lampblack, resin, and a few other ingredients, which are boiled together till they reach the consistency of melted tar. From between the cylinders it is carried to a drying frame made in the shape of a reel, and subjected to a high temperature in the drying-room, which is heated generally by steam pipes. After the drying process it is given to workmen who make all the rough places smooth by rubbing with pumice-stone and water. The cloth is then passed through the same operation as before, rolling, drying, and rubbing, and this is repeated from three to five times, or until the required thickness has been laid on. After the last scrubbing down, the fabric is taken to another department, thoroughly varnished, and again passed through the heater. It now appears as a piece of cotton cloth, with one black side looking very much like patent leather. One step yet remains to be taken. The cloth is passed between heavy rollers, which cover its surface with regular indentations resembling the grain of leather. It is now ready for the market. We venture to say that as many frauds are perpetrated in this article as in any other article that can be mentioned. Manufacturers who desire to turn out a heavy material first fill the cloth with clay, and the result is an enamel that will crack during the cold weather of winter, or, in their endeavor to turn out a cloth that will stand a low temperature without cracking, they fill the merchant's shelves with material that will be sticky in summer. The poor quality is used in the cheap trunk and bag trade, but none but the best will do for the outside wear that comes upon carriage tops. Taunton turns out the best line of goods of this description that comes to the market.—*Manufacturers' Gazette.*

Baked Angle Worms.

The *Pall Mall Gazette* (London) gravely reports that a group of French gourmets have tested the edible qualities of the common earth worm, whose agricultural services have been so recently demonstrated.

"Fifty guests were present at the experiment. The worms, apparently lob-worms, were first put into vinegar, by which process they were made to disgorge the famous vegetable mould about which we have recently heard so much. They were then rolled in batter and put into an oven, where they acquired a delightful golden tint, and, we are assured, a most appetizing smell. After the first plateful the fifty guests rose like one man and asked for more. Could anything be more convincing? Those who love snails, they add, will abandon them forever in favor of worms."

Explosives from Tar, Pitch, Coal Dust, and Peat.

Two years ago, Hellhoff, of Berlin, patented a process for making explosives from crude coal tar oils by direct nitration with strong nitric acid. The mixture of various nitro-substances thus obtained was washed and dried, then mixed with oxygenated substances. The alkaline nitrates, chlorate of potash, and the strongest nitric acid served for this purpose.

Experience gained by the long-continued manufacture with aid of steam proved that the separate fractions of the crude tar oils, even those of the highest boiling point, were capable of nitration, and gave a satisfactory yield of nitro-derivatives.

The question naturally arose whether the tar itself could not be nitrated and utilized for making explosives. Experiments made in this direction soon proved that the treatment of coal tar with strong nitric acid was a very dangerous operation, that its employment on a large scale would be attended with great difficulties, and the greater part seemed to be burned up and lost. In subsequent experiments, therefore, an acid of 1·53 to 1·45 specific gravity was employed. The liquid tar is gradually stirred into the acid, the surface of the acid becoming covered with it. After a while this layer of tar contracts on stirring and settles slowly to the bottom. After about ten minutes the mass at the bottom puffs up, and gradually changes from a liquid to a solid or pasty state. The completion of the operation can be recognized by the mass rising from the bottom and spreading itself evenly over the surface. When the acid has been all used up the tar which is added no longer contracts and settles to the bottom. The chemical changes does not produce an excessive amount of heat, so that cooling is unnecessary.

The product thus obtained is well washed with excess of water, and the sour wash water that remains in its pores is expressed out. The purified product is then mixed with the oxygenated bodies above mentioned. One part by weight of the product dissolves very slowly with the evolution of but little heat, in three parts of nitric acid, specific gravity 1·52.

All these mixtures gave new explosive compounds of different degrees of violence. The power possessed by a solution of these new nitro-derivatives in concentrated nitric acid is evident from the fact that a small quantity of it, when exploded by a double dynamite exploder, was able to shatter an iron shell.

Owing to the varying composition of the tar, it is impossible to give the exact proportions in all cases of the oxygenated substances which must be added, but in the experiments it was found that two to five parts of concentrated nitric acid (chloric acid), or four to six parts of the salts, were sufficient for one part of the nitro-derivative. The great advantages offered by this process are: cheapness of the material to be acted upon, the cheapness of the lighter acid used (the difference is about 60 per cent), and finally in the quiet and regular manner in which the operation takes place, permitting of the use of more simple and less expensive apparatus, etc.

These favorable results led to further experiments upon the pitch, the paraffines, etc., as well as the mineral oils. The possibility of nitrating the latter seemed probable from their great similarity to the crude tar oils. Experiment, in fact, proved that they reacted exactly alike. But the strongest nitrating agents are required to act upon the purified mineral oils used for illumination. A mixture of equal weights of the strongest nitric and sulphuric acids, or a mixture of an alkaline nitrate with sulphuric acid, was employed.

On paraffines and similar products the weaker acids are as ineffective as on purified mineral oils. By the action of the nitrating agents mentioned upon purified mineral oils, nitro-compounds were precipitated of a light yellow or light brown color having the external appearance of rancid fat. These products are difficultly soluble even in the strongest nitric acid. Pitch treated with nitric acid of 1·45 to 1·52 specific gravity gave a yellow-brown solution, and from this light yellow to brown scales separated on washing with water. The oil and pitch from wood tar were treated with the weaker acid (1·45), and those from brown coal and stone coal with the stronger acid (1·52). The products thus obtained are easily soluble in strong nitric acid with slight evolution of heat. These nitro-compounds when mixed with oxygenated bodies also form powerful explosives, but the quantity of the latter used must be two to four times greater than that added to nitro-derivatives of tar. There is no special advantage in working these materials as compared with tar or even the tar oils, for a high grade of acid must be used, while the increased quantity of oxygenated salts raises the price still higher. Still, this process is of some importance in so far as pitch is concerned, since the price of tar is likely to increase as more uses are found for it.

All the special products of the distillation of coal having

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been found capable of being converted into explosives by nitration, it only remained to try an experiment on the original materials, coal and peat. Wood was excluded from the list for its conversion into an explosive (pyroxyleine) had already been accomplished by Trauzl. It was found that the direct conversion of coal into an explosive by extracting the nitro-products, would involve very expensive and tedious manipulations. After numerous unsuccessful experiments, in which the product was either completely burned up, or the coal was but slightly acted on, we were induced to try a gradual nitration. The coal, in form of a fine dust, was first treated with weak nitric acid, specific gravity 1·40 to 1·48; the weight of acid required was ten times that of the coal used. When stone coal was introduced slowly into the acid the rise in temperature was inconsiderable, and some hyponitric acid was formed. The action was much more violent in the case of brown coal, and least so with wood coal. After the operation with any coal, a large portion of the material to be nitrated remained apparently unaffected, and formed a thick sediment on the bottom of the vessel, while the nitro product was dissolved in the acid layer above and imparted to it a light brown color—with brown coal nearly a black color. When this fluid layer was well washed with water, the nitro product was thrown down as a fine brown powder. This precipitate was filtered out, and washed repeatedly until the wash water was no longer acid. The sediment was also washed several times to remove the exhausted acid, then dried and finally treated with the most concentrated acid. It separated into two layers, the liquid one was treated just as before described, to obtain the nitro product suspended in it. Again the precipitate was brown, either light or dark. The solid residue was again washed and dried, then treated with the most powerful nitrating agents. In this way we succeeded in converting nearly all the brown coal and stone coal into nitro bodies, as well as the larger portion of the wood coal.

The yield was scarcely sufficient to compensate for the large consumption of acid, especially with the wood charcoal and coke. All the nitro products obtained are nearly alike in color, state of aggregation, and other properties. They are insoluble in water, soluble in alcohol, and the most concentrated in nitric acid, and burn with strong aromatic odor. They are heavier than water.

The results of experiments made on peat were considerably more encouraging, different kinds being tried. A firm, solid kind called "bog peat" (*Moortorf*), from Lüneburg, was tried after a small test had shown that the reaction would not be too violent. It was first subjected to the action of equal parts by weight of the strongest nitric and sulphuric acids for several hours. The substance changed color from dark brown to dark red. Ignited in the air it burned with a lively flame and strong, aromatic odor. When soaked in a solution of chlorate of potash and dried, it formed a powerful explosive. If the same peat was well pounded before the nitration so that the humus substance was separated from vegetable fibers, and a larger surface was exposed to the powerful action of the acids, the earthy humus constituents were converted into a dark brown liquid, sticky nitro-body, have the external characters of that obtained by nitrating the heaviest tar oils. Its action when mixed with oxygenated bodies is also just like the latter. The other nitro substance, formed from the finely divided fibers left in the dry distillation that attends the formation of peat, yields an explosive without any admixture of an oxygen-bearing salt. In the open air it burns very rapidly, leaving a slight carbonaceous residue.

Peat containing animal admixtures acts just like this bog peat. Peat that seemed to be of later formation would not bear the action of concentrated acids. There was a violent evolution of hyponitric acid, and in spite of the most careful cooling the heat became so great that there was danger of its reaching the ignition temperature of the nitro-derivative, so that the process had to be interrupted. The same peat was then mixed with ordinary commercial nitric acid, specific gravity 1·35, and as the action of this acid was scarcely perceptible, concentrated acid was gradually added until the process began to be quite violent. The acid had then been brought up to a gravity of 1·45. After the reaction had gone on for several hours with careful cooling, the product was washed and dried. This is also an explosive without the admixture of the oxygenated body, but not so strong as that made from bog peat with the stronger acids.

Others of the newly prepared nitro derivatives, especially those from the crude tar oils by repeated nitrations, form explosives alone; but they are always weaker than when mixed with oxygenated bodies.

The manufacture of explosives from peat, owing to the cheapness of the material and its wide dissemination, as well as the simplicity of the process, is doubtless an important step in advance.

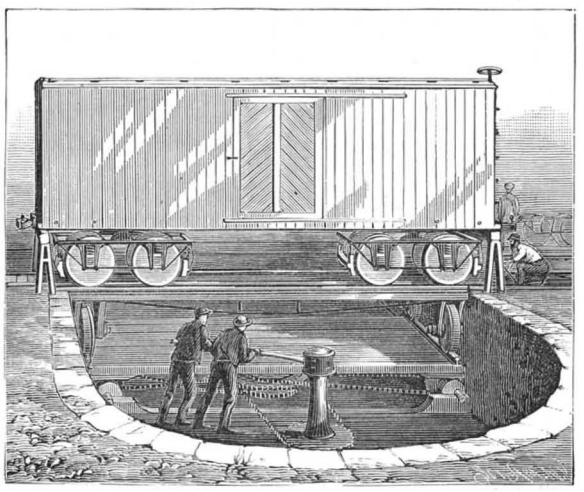
The chief characteristics of the newly-prepared nitro-substances are the following: The specific gravity of all is very nearly that of water. They all possess a powerful aromatic odor, resembling the fruit ethers, which is particularly noticeable on burning them. All solutions of these substances have a strong refractive power. The greater part of them are soluble in the strongest nitric acid, as well as in alcohol; they are all insoluble in water. In the open air they all burn with a bright, but more or less smoky flame. Their molecules are so slightly united that they can be exploded alone or mixed with oxygenated substances, by simple ignition.—*Deutsche Industrie Zeitung*, *No.* 36.

The Microphone and Fire Damp.

A new application of the microphone to the determination of the position of nodes and ventral segments in columns of vibrating air has been communicated to the Academy of Sciences by M. Lerra-Carpi. The microphone is mounted on an elastic membrane stretched over a little drum, and then lowered into the sounding pipe. When the apparatus came to a node, the telephone in circuit with the microphone gave out a rumbling sound, similar to that caused by an induced current. On the other hand, when the microphone passed a belly the sounds become very faint and rare, while at intermediate points they increased or diminished according as the microphonic sounder was brought nearer to a node or a belly. It is believed that the microphone may thus be made useful as a detecter of fire damp in mines. According to some observers such explosives are always preceded by undulations too feeble to be detected by the human ear, but these latter would be revealed by a system of microphones placed at intervals through the mine.

APPARATUS FOR CHANGING CAR TRUCKS.

The engraving shows a novel device for facilitating the changing of the trucks of railroad cars when the cars are to pass upon a track of different gauge. The invention consists of a platform or frame raised and lowered by means of eccentrics, and provided with rails corresponding with stationary rails placed at a lower level than the rails of the main line and sliding tracks, and at right angles therewith, and carrying a transfer-truck to receive and carry the car trucks. In combination with the eccentrics carrying the



ATKINSON'S APPARATUS FOR CHANGING CAR TRUCKS.

platform or frame there are chain-wheels, chains, and a capstan, by which the eccentrics can be readily operated to raise and lower the truck receiving the platform or frame.

By means of this apparatus a train of cars can be transferred, or all of the trucks changed, without disconnecting the train. All that is necessary to do is to back the train over the apparatus and transfer the trucks in the manner illustrated by the engraving.

This invention has been patented by Mr. Geo. W. Atkinson, of Petersburg, Tenn.

Cotton Manufacturing in the South.

The development of cotton manufacturing in the South is one of the most notable and promising industrial occurrences of the day. Not merely because of the rapid growth of the business, but more because of its appropriateness and apparent profitableness. The conditions would seem to be altogether in favor of the Southern mills, so far as the supplying of their home market is concerned at least, and it remains to be determined whether they have not also marked advantages in the competition for control of the markets of the West. The larger part of the charges for freight, jobbers' commissions, storage, insurance, etc., which the Eastern mill owner has to pay, the Southern mill is exempt from; and the difference from $2 to $3 a bale in freight alone is clear saving.

The Baltimore *Journal of Commerce* estimates the actual capital now invested in Southern cotton mills at $50,000,000, of which nearly one-third has been invested within two years.

Touching the prosperity of these Southern mills the *Journal* says that ten per cent annual dividends are the lowest reported, and this after a large amount has been taken from the earnings for increasing the size and capacity of the mills. Under more favorable conditions the dividends have been much larger, as in the following instances:

The Augusta, Ga., factory, the oldest mill in that city, has a capital of $600,000, and runs 26,200 spindles and 790 looms; from 1865 to 1882, 17 years, it has paid out in cash dividends $1,467,000, or about 2½ times its capital, or an average of 14½ per cent per annum; besides this it has laid aside a surplus of between $340,000 and $350,000, or over 50 per cent of its entire capital; its stock is worth from 160 to 170. The Langley mill of the same city has a capital of $400,000, with 10,000 spindles and 329 looms; it has paid in the past 3½ years 47½ per cent dividends, or an average of about 15 per cent per annum; last year it paid a dividend of 20 per cent; its present surplus is $200.000, and its stock is worth from 160 to 170. The Graniteville mill, also of Augusta, with a capital of $600,000, has 34,600 spindles and 900 looms; this company pays 10 per cent dividends, and then puts its surplus into new spindles; out of its surplus earnings, that is, its earnings above its dividends, it has built, without a dollar's expense to the stockholders, the Vaucluse mills, with 10,000 spindles for making fine fabric, at a cost of $340,000; it has also laid aside an additional surplus of $125,640. The Enterprise was started in 1877, with a capital of $900,000; it has also paid 10 per cent dividends, and laid aside the rest of its earnings as a surplus. The Wesson mills of Mississippi have paid a dividend of 26 per cent, and the Troup factory of the same State 24 per cent, while from time to time we have noted dividends of from 30 to 50 per cent, the latter having been earned by a Pulaski, Tenn., mill last year.

Against this, by way of comparing the relative profitableness of Northern and Southern mills, is set the assertion of Mr. Russell, Member of Congress from Massachusetts, who said in the House of Representatives that he had from official sources a statement showing that fifty of the leading corporations in Lowell, Lawrence, Chicopee, and Salem, Massachusetts; Manchester, Nashua, and Newmarket, New Hampshire; Lewiston, and other points in Maine, representing a capital of $50,000,000 engaged in manufacturing the various grades of cotton and woolen fabrics, have paid to their stockholders in the last five years an average dividend of a little less than 7 per cent per annum only.

The cotton mills of the South already give employment to something like 40,000 operatives.

Georges Leclanche.

On the 14th of September, 1882, at 7 P.M., Georges Leclanché died at Paris, at the age of 43 years, a man universally well known and esteemed, the inventor of the peroxide of manganese battery. After leaving the Ecole Centrale des Arts et Manufactures de Paris, in 1860, Leclanché entered, as chemical engineer, the laboratory of the Compagnie des Chemins de Fer de l'Est, where he remained until 1867.

The year 1867 was the time of his first patent for peroxide of manganese batteries with a porous cell. He left the Compagnie to devote himself almost entirely to the industrial development of his idea, which he completed by a series of subsequent patents. Two of these new patents are especially important: that of 1873, relative to cylindrical agglomerate surrounding the carbon, and that of 1876, relative to movable agglomerate plates maintained against the carbon by India-rubber bands. Very limited at its commencement, the manufacture of Leclanché batteries is now almost monopolized at Paris by M. Barbier, employing 50 workmen, who manufacture at least 2,000 plates per day, and have turned out during the year 1881 about 280,000 elements.

At the present day complete elements or simply agglomerated plates manufactured at Paris are exported to all parts of the world. Leclanché batteries have penetrated everywhere; the recent invention of the telephone has given them a fresh impetus, and opened up an immense trade, of which the importance can scarcely at present be predicted; their increasing employment for domestic purposes, bells, calls, electric lamp-lighters, telephones, etc., has familiarized the public with electricity, and, to some extent, made way for more important applications. The capital invention of M. Leclanché will have been, therefore, at once a service and a benefit. His premature death in the full maturity of his intellectual power and of his chemical and electrical knowledge will be deeply regretted by all those who are interested in the progress and future of the applications of electricity.

Outside of his researches on batteries, which, to reduce them to a practical form, absorbed a large portion of his time, M. Leclanché was occupied with electric horology, and devised, to distribute the time to recording chronometers, a sure and ingenious system of simple contact, very little known, and applicable to a number of electrical instruments.—*The Telegraphic Journal and Electrical Review.*

The Atlantic Ocean Cable of 1869.

It is stated by the Anglo-American Telegraph Company that the Telegraph Construction and Maintenance Company, with their S.S. Scotia, have succeeded in picking up the Anglo-American Company's cable laid in 1869, between Brest and St. Pierre, in mid-ocean, in depths varying from 1,600 to 1,930 fathoms of water, and repairing the fault which occurred on the 18th March last. They have also repaired a minor fault at a distance of 335 miles from Brest, in a depth of 1,269 fathoms. The whole of the company's system of cables and land lines is now in perfect working order and condition.

Novel Fire Escapes.

The last invention for the protection of theater audiences is a "penetrable safety wall," which has just been patented by an engineer at Kottsbus, Germany. The plan is to make the interior wall in all parts of the theater of papier mache, made after a certain method. Such a wall will have the appearance of massive stone, but, by pressure upon certain parts where the words are to be painted in luminous letters, "To be broken open in case of fire," access to the exterior corridors is to be obtained, whence escape to the outer air can be made.

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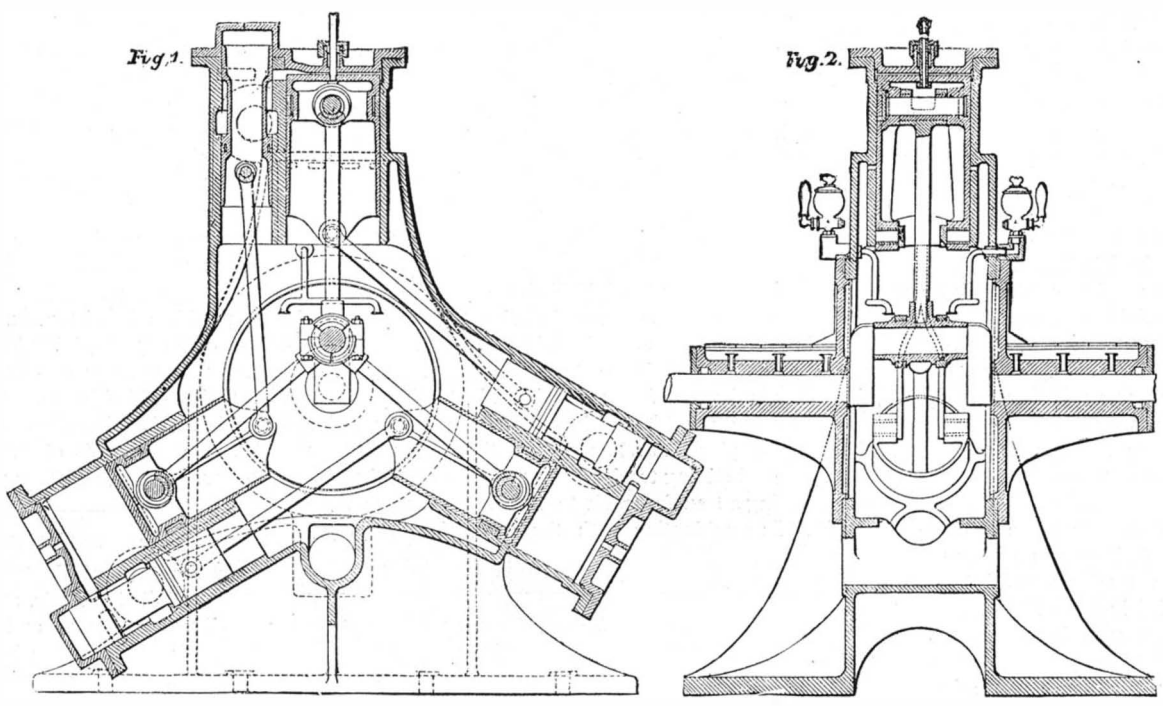
IMPROVED THREE-CYLINDER ENGINE.

We give engravings of a new pattern of three-cylinder engine constructed by Mr. Jabez James, London, the engine being one designed and patented by Mr. James in conjunction with Mr. Walter Wardrope. The special features of the engine are the arrangement of the valves and ports, and the manner in which the valves are driven.

Referring to our illustrations, it will be seen that the engine has three single-acting cylinders, each of which is provided at its outer end with a short straight port leading to the corresponding valve casing. The slide valves are piston valves, and the cylindrical casing in which each valve works communicates at its outer end with the exhaust, while the central portion of its length is in communication with the steam supply. In addition to the port just mentioned, the opening and closing of which is controlled by the valve, each cylinder has other exhaust ports, so placed that they are uncovered by the piston when the latter has made about five-eighths of its stroke toward the crank-shaft; these supplementary exhaust ports are shown dotted in Fig. 1, and in section in Fig. 2, from which their arrangement will be readily understood. These supplementary ports permit of the escape of a large proportion of the steam, as the piston, after having uncovered them, moves but slowly, so that they are left uncovered during a considerable fraction of the revolution. As will be seen from our engravings, the exhaust steam enters the engine casing in which the crank revolves, and finally escapes at the bottom to the exhaust pipe.



IMPROVED THREE-CYLINDER ENGINE.

The manner in which the valves are driven will be readily understood from Fig. 1, from which it will be seen that each valve is driven by a rod connected to the piston next in the rear of it, the engine illustrated being arranged so that, looking at it as in Fig. 1, the crank-shaft would rotate in the direction of the hands of a clock. It will be noticed that the arrangement of valves and steam passages adopted allows of the connecting rods being made long, without causing any increase in the clearance spaces due to lengths of steam ports.

The crank-shaft has very long bearings on each side of the crank, and also a very long crank-pin bearing as shown in Fig. 2, so that the engine is well adapted for high speeds. Power can be taken off either end of the crank-shaft, and the arrangement allows the engine to be accurately balanced. One of these engines, shown at work lately at Mr. James's factory, ran exceedingly smoothly and steadily. This engine has 6-inch cylinders and 6 inch stroke, and is capable of being worked up to 40 indicated horse power; at present, however, it has been worked up to 16 horse power only, on account of an insufficient steam supply. The engine illustrated is fitted with single slide valves only, but the engines are also arranged to be fitted with expansion gear constructed on the compound system. In another arrangement adopted the valve rods, instead of being coupled to the pistons, are coupled to the connecting rods, it being thus possible to vary the cut-off within wide limits without incurring complication.
—*Engineering.*

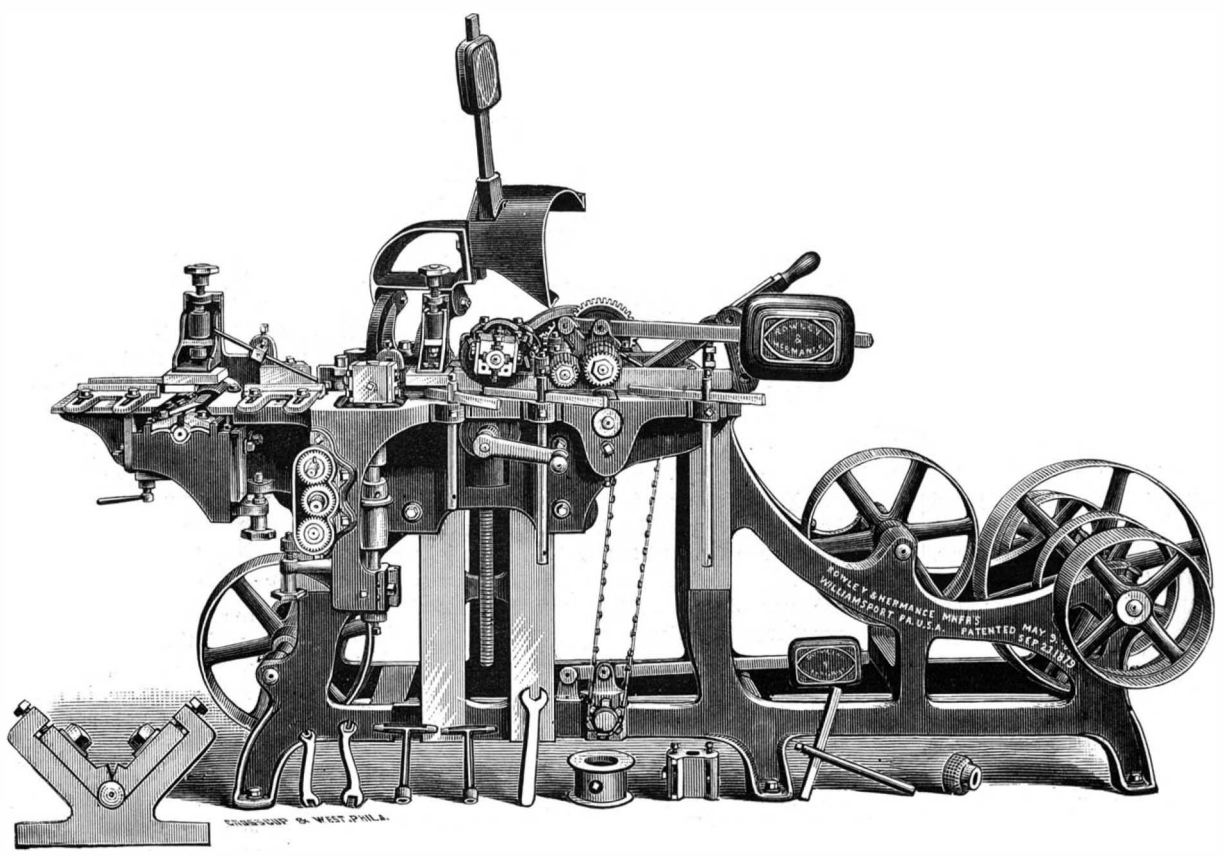
THE great iron bridge of the Atlantic and Pacific Railroad over the Cañon Diablo, in Arizona, has recently been completed. It is 500 feet long, the cañon being some 250 feet deep. The height of the bridge is 240 feet, or 14 feet higher than Bunker Hill Monument. The weight of the bridge amounts to something like 800,000 pounds, and the cost of construction was $200,000.

The Thomson Ferranti Dynamo-Electric Machine.

The new machine of Sir William Thomson and Mr. Ferranti consists simply of a wavy or gridiron-shaped ring of copper revolving between two sets of electro-magnets. There is no commutator, as in other machines, and the cost of construction is much reduced. It is stated that the experimental trials have shown that 12 (20 candle-power) incandescence lamps can be produced per horse power. It is further remarked that the Thomson-Ferranti machine is superior to that of "Brush," in the proportion of 12 to 3¼, or in other words, that the power required to produce 12 lamps of 20 candle-power each by the Brush system is, roughly speaking, about four times greater than that necessary to give the same result in the former. The electro-magnets of the new machine are intended to be excited from a separate source. Mr. Robert Hammond states that one of the new machines will light five times as many incandescent lamps as any other machine.

NEW FOUR-SIDED MOULDER.

With moulding machines heretofore made the principal fault has been that the feed works were not strong enough to carry the work through the machine, the operator being obliged to crowd the stuff, especially when it is a little damp. This is not only annoying to the workman, but expensive to the proprietor. on account of time lost.



FOUR-SIDED MOULDING MACHINE MADE BY ROWLEY & HERMANCE.

In this machine there is an entirely new device for gearing the under feed roll, making it a very strong feeding machine. The under roll is so geared that it feeds equally strong when the bed is lowered to fourteen inches, as when working thin stuff. This is an important feature in sticking door stiles and rails or other wide stock, and is peculiar to this machine. There are two upper feed rolls, one weighted, the other held firmly by springs. The frame is heavy and strong, being one solid casting. The table is raised and lowered with a crank on top of the machine, convenient to the operator. The arbors are steel, running in Rowley & Hermance's patent journal box, which is made in three parts, taking up side as well as top motion, thereby allowing this machine to do very smooth work. The heads are also of steel, the top head being slotted on four sides; the two side and the bottom head are slotted on two sides. The top head-stock has a lateral adjustment, and by a novel device the outside head-stock can be set at any angle desired and fastened, and then moved out or in or up and down accurately while the machine is in motion. The inside head-stock has a horizontal adjustment. There is a slide fitted into the table that can be moved to and from the under cutter-head, so as to allow cutters to project through the face of the table and act as a chip breaker.

The patent hood over top cutter-head is adjustable to and from the cutters to allow long knives to be used on head, and the hood is weighted to act as a combined pressure shoe and chip breaker. The frame which holds the hood is hinged, and has a swivel or circular motion, and can be thrown entirely out of the way to give the operator free access to cutter-head. There are two adjustable yielding pressure shoes for holding the stuff firmly to bed while being worked.

These machines are made by Messrs. Rowley & Hermance, Williamsport, Pa., who also manufacture mortisers, tenoners, and different sizes of moulders; also sash, door, and blind machinery.

Artificial Wool from Vegetable Fibers and Wool.

E. Stutzer, in Berlin, has devised a method for making artificial wool by mixing wool with vegetable fibers like flax, hemp, jute, etc., so that it will have a beautiful silky luster, and both the wool and other fiber will take the same colors.

It is well known that in bleaching and dyeing, fibers of vegetable origin require an entirely different treatment from those of animal origin. Hence it was necessary, when colored wool was to be mixed with other colored fibers, to dye them separately, for if the mixture was dyed the different fibers would take different colors in the same bath.

Stutzer found that this unequal dyeing was due to a gummy substance found in the cells of the plant fibers, and his process is intended to entirely remove this substance. In a vessel capable of holding about a hundred gallons, and filled about two-thirds full of water, he puts 220 lb. of the stuff and adds caustic alkali, and afterward some soap. The liquid is heated to 175° C. (347° Fahr.), by means of a coil of steam pipe in the bottom of the vessel, and the materials boiled half an hour. At the end of this time they are taken out, washed, and rinsed, and then put in a second bath containing 62 parts ammonio-sulphate of copper to 2,000 of (carbonate of) soda, or twice the quantity of the former without the latter. The goods are boiled in it for half an hour, washed, rinsed, and dried. If the goods are to be very soft the last bath is omitted.

When silk is to be mixed with vegetable fibers a similar difficulty is met with in dyeing the mixture. Agache & Imbs, in France, overcame this difficulty by softening the vegetable fibers in an emulsion of animal oils with a soda solution, and then piling them up in heaps till a fermentation takes place. The plant fibers are mordanted in this way, and when mixed with waste silk can be spun like flax, wet or dry.

P. N.

MEDITERRANEAN fishermen complain that their sea, formerly free from sharks, is now infested with them. The sharks come through the Suez Canal from the Red Sea and the Indian Ocean, and make sad havoc among food fish.

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THE PROSPECTS OF SILK CULTURE IN THE UNITED STATES.

The prospects of a large and healthy, though probably not rapid, development of the native silk industry in this country are now particularly bright, for three reasons:

1. The general prosperity of our people and the wide diffusion of wealth have been attended by, if they have not created, a large and steadily increasing demand for silk fabrics, as the annual importation of over forty million dollars' worth of raw and manufactured silks amply demonstrates.

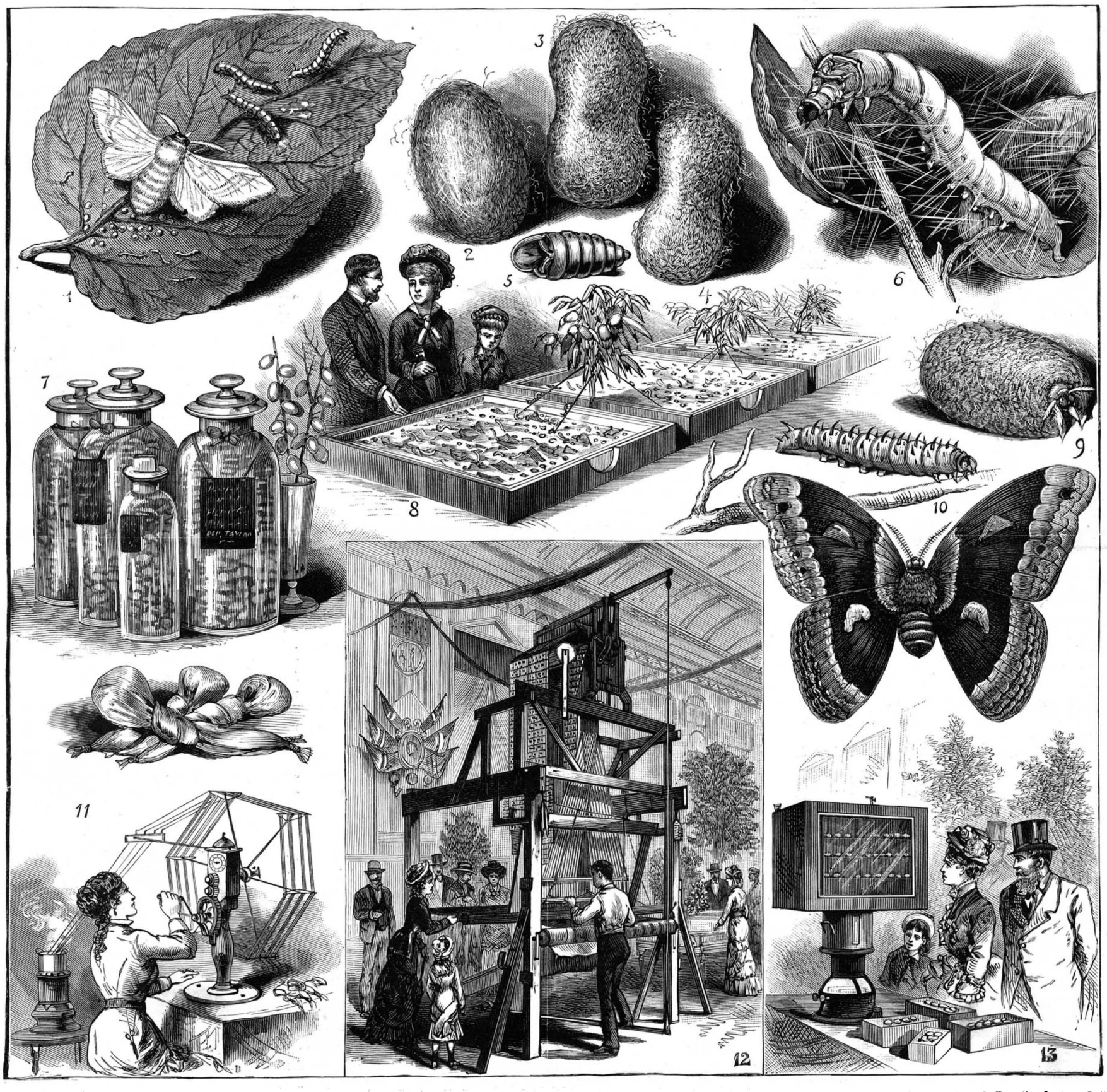
2. The rapid and stable development of silk manufacturing here during the past ten or a dozen years, and the probability that our manufacturers will not stay their efforts until at least the home market has been conquered. Our two hundred silk mills are already converting from ten to twelve million dollars' worth of imported raw silk into manufactured goods, worth thirty million dollars or more. In other words, there is now a home demand for at least ten million dollars' worth of raw silk to encourage home production—a demand that has doubled in the past two or three years, and is likely to increase quite as rapidly in the future. The declining silk production of Europe, owing to diseases affecting the worms, indicates that we may, if we choose, compete with the East for that vast market also, certainly with respect to the supply of eggs and cocoons.

3. In all parts of the country, particularly in the South and Southwest, a lively popular interest in silk culture has arisen during the past five years, and hundreds are experimenting in that direction with encouraging results. The Women's Silk Culture Association of the United States, established only two years ago, reports over ten thousand correspondents. Trees and silk worm eggs—technically *grain*—have been sent by them to twenty-four States for testing local and personal capabilities for silk production; and American raw silk and grain have been submitted for critical tests in Turkey, Milan, and Lyons, winning such commendations as to prove that, if the question of cost can be as satisfactorily settled as that of quality has been, our silk growers need not fear competition in any quarter.

The question of cost is now the important one. The caring for silk worms is likely to be here, as it is almost everywhere where its prospers, a domestic enterprise chiefly employing the spare time of women and children during the early summer. The time available for such pursuits is now largely unoccupied; devoted to silk growing it would be so much clear gain; yet the industry must yield an enticing profit for the time devoted to it, compared with other possible occupations, or it will not command more than sporadic attention. Fortunately the number of those who are now trying their hands at silk raising is so great that the financial problems involved cannot remain long in doubt. If the stories of profit told by many of these experimenters are no more than half true the industry is bound to prosper, certainly in the South, where the conditions are most favorable.

The Women's Silk Culture Association, whose headquarters are in Philadelphia, has been, perhaps, the most influential single agency, both in developing the revival of interest in silk culture and in keeping it from extravagance or anything tending to a repetition of the popular craze of forty years ago. The establishment of a new industry, involving the intelligent action if not co-operation of thousands largely unfamiliar with business methods, and unused to sustained painstaking labor, is not an easy undertaking; and the success already achieved through their efforts speaks well for the soundness and prudence of the methods of the association.

The beginning of the revival was manifested during the Centennial Exhibition. The exhibition and training school organized in the Permanent Exhibition by the association gave it a new and powerful impetus, the influence of which was broadened by subsequent exhibitions of silk production at State fairs in Pennsylvania and New Jersey, and at the American Institute Fair in this city. The remarkably successful exhibition of the Women's Association in Philadelphia last spring added materially to popular knowledge of silk culture and the industrial inducements it offers. In the meantime a silk culture society has been projected if not organized in New Orleans, and establishments for the cultivation and distribution of silk worm eggs and trees for feeding worms have been established in or near various Southern cities. In this city a Silk Exchange has been organized for the purpose of furthering the silk industry, and during the summer an exhibition of the processes of silk production and manufacture was maintained for several weeks. The accompanying engravings give several views of the materials and processes there shown. The contrast in size of the cultivated silk moth and some of our native moths yielding silk (and of their cocoons) is very great; yet none of the latter appears to yield so large a quantity of fine silk in condition to be readily unwound or reeled from the cocoon. It is quite possible, however, that by careful cultivation and selection there may ultimately come from our native moths insects which, in yield of silk, hardness, and general availability for this climate, will surpass the foreign moth as markedly as they already do in size and beauty.



1. The moth and larvæ one and four days old.—2, 3, and 4. American, French, and Chinese Cocoons.—5. Chrysalis.—6. A full-grown larva spinning.—7. Bottles containing American cocoons.—8. Breeding boxes.—9. Moth leaving cocoon (natural size) —10. The ailantus moth and larva (half size).—11. Reel and finished raw silk.—12. Loom.—13. Apparatus for loosening the silk threads from the cocoons.

VIEWS FROM THE SILK INDUSTRY EXHIBITION AT NEW YORK.

THE deepest mine in the world, according to Prof. H. Hoefer, is the Przibram silver mine in Bohemia. The lowest depth is 3,300 feet below the surface.

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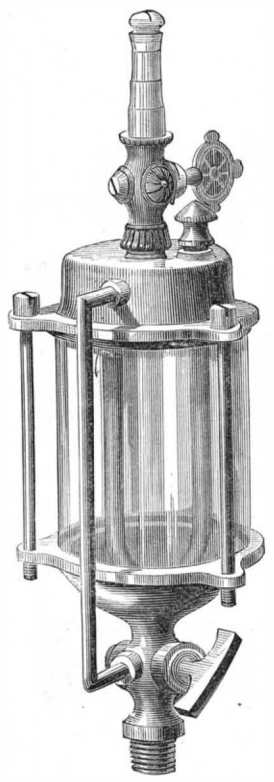
RECENT INVENTIONS.

New Alcohol Cock.

This is an improved alcohol cock to be used in dissolving the hydrocarbon substances in gas service-pipes, and it is arranged so as to prevent the loss and waste of gas and alcohol during the operation. The device consists of a closed vessel, adapted to contain alcohol, connected with the gas service-pipe, and provided with a three-way cock for establishing communication with the gas service-pipe or between the gas service-pipe and a pipe or tube leading from the cock up to the top of the closed vessel, so that the gas issuing from a test-cock on the vessel can be ignited when the direct communication between the gas service-pipe and the vessel is interrupted, this test-cock being used to ascertain if the obstructions in the service-pipe have been removed by the alcohol flowing from the vessel into the service-pipe for the purpose of dissolving these obstructions, generally consisting of congealed hydrocarbons. The alcohol is filled into the vessel through a tube provided with a circular loop or bend. In this way a trap or seal for preventing the escape of gas is formed. To use the alcohol cock the cap at the top is unscrewed and the alcohol is filled into the vessel through the seal tube, the plug of the lower stop-cock having been turned so as to close the communication of the glass vessel with the service-pipe, and close the pass-tube shown at the front of the glass cylinder. When the vessel is filled the cap is closed. If the plug of the lower cock is turned to establish a communication between the top and bottom of the vessel and the service-pipe, the alcohol will flow from the vessel into the service-pipe and will dissolve the hydrocarbon substance which closes the pipe and obstructs the passage of the gas. After a certain quantity of alcohol has been admitted into the service-pipe the plug is turned one-quarter of a revolution, so as to interrupt the communication between the service-pipe and the bottom of the vessel, and to establish a communication between the service-pipe and the top of the vessel by means of the pass-tube. The cock near the burner is opened, and if the gas can be ignited at the burner, the service-pipe is clear and the substances have been removed; but if the gas cannot be ignited the service-pipe is still obstructed and an additional quantity of alcohol must be admitted into the service-pipe, and this must be repeated until this pipe is cleared—that is, until the gas will burn at the test-burner.

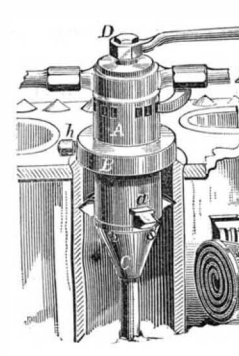


New Alcohol Cock.

This invention has been patented by Mr. C. C. Mulford, of Streator, Ill.

New Tube Cutter or Expander.

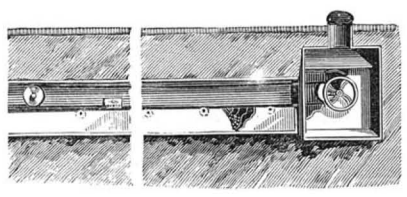
We give an engraving of a new tool designed for the removal of tubes from boilers in order that they may be replaced with new ones. The tubes are cut from within just inside of the flue sheet by the revolving expanding cutters of the tool, and its central bar being considerably longer than the main portion of the tool, prevents the tube from dropping after being cut. The tool may be withdrawn and the cutters removed and replaced by the wrench jaws which bite into the inner surface of the tube end and admit of wrenching it out of the tube sheet. Should a burr be found on the outside of the end of the main part of the tube, it may be removed by using the three external cutters shown in the engraving as detached from the tool. A set of jaws for engaging the inner surface of the tube, for the purpose of pulling it out of the boiler, are also shown in detail. These cutters and jaws are moved by the spiral in the end of the conical portion of the tool, and by expanding them more or less the same tool is adapted to different sizes of tube. The tool is worked by the pawl and ratchet in either direction, and when it is desired to work near the rim of the boiler one half of the handle may be removed and the tool can be worked by the remaining handle. This tool may be used to great advantage as a tube expander, also as a wrench for nipples and pipes. As it works from the inside there is no danger of collapsing the tube. It can also be used to hold nipple and short pieces of pipe while they are being threaded on the outside. The general usefulness of this tool will be understood and appreciated by fitters and boiler makers whose patience has been tried by ordinary tools for performing the various operations of which this instrument is capable. This invention has been patented by Mr. A. C. Hunsberger, of Portland, Pa.



Device for Laying and Holding Underground Electric Wires.

The engraving represents an improved device for laying and holding underground wires, recently patented by Dr. H. C. Register, of 1907 Chestnut street, Philadelphia, Pa.

In this device there is a water tight longitudinal boxing, of cast or sheet iron, or of wood or clay, placed in the street under the roadway, and at suitable intervals it is provided with enlargements having manholes leading to the street. On the bottom of the longitudinal box there are two or more longitudinal troughs or compartments, some for telephone and telegraph wires, and the others for electric light wires. Two partitions on the bottom of the longitudinal box extend throughout its entire length, and near the upper edges of these partitions a series of rollers are journaled. In each enlargement at the end of a section, and at suitable intervals in the longitudinal box, is journaled a horizontal shaft,

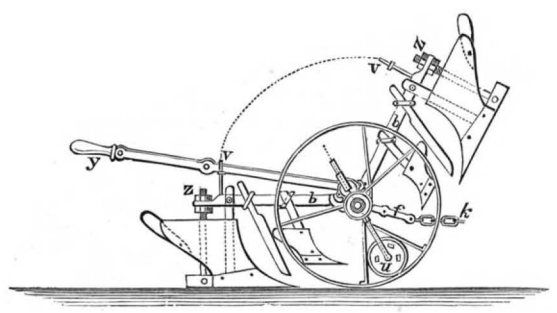


each carrying a grooved pulley directly above the middle line between the partitions. Endless ropes pass over these pulleys, and the ropes can be moved by turning the shaft by means of hand wheels at the manholes.

A carriage rests on the upper edges of the partitions, and can be firmly clamped to the endless rope. In operation the clamping carrier is fastened to the rope at one manhole or enlargement of the box, and one or more wires are attached to the pegs or staples of the carrier. By rotating the shaft the carrier will be carried to the next enlargement or manhole, and the wires will have been carried through the longitudinal box from one station or enlargement to the next, and can easily be placed into one of the compartments of the box. In this manner the wire can be carried through any length of boxing, for when the ends of the wires have arrived at one station—that is, at the end of one section of the boxing—the wires can be attached to the carrier of the next section, and so on. The wires can be removed in a similar manner.

Reversible Plow.

The engraving shows a new reversible plow, constructed so that it can be reversed at the end of the furrow in a very simple and convenient way, can be adjusted in height as may be necessary, and is provided with a carriage that can



be adjusted in width to suit the furrows, and which draws the plow with an equal and uniform draught. The engraving shows the plow with one of the shares raised, while the other is in position for work. This improvement is the invention of Mr. Julius Hartman, of New York city.

Ammonia for Extinguishing Petroleum Fires.

A committee of the Polytechnic Society of Munich has issued a report on the means to be employed for extinguishing burning petroleum. They say that since concentrated water of ammonia evolves a great amount of gas when heated, and as this gas is unable to sustain the combustion of any burning substance, burning petroleum must also be extinguished for want of oxygen if brought into a space filled with ammonia gas, and it may be safely asserted that petroleum will not continue to burn even in a room filled with atmospheric air, when there is a considerable quantity of ammonia gas mixed with the air, assuming, of course, that the place is closed so as to prevent a free interchange of air and cut off the access of a fresh quantity of oxygen to support combustion.

A second condition necessary for success, which is intimately associated with the first, is that the space be not much larger than that of an ordinary house-cellar, so that there shall be only a small number of barrels of oil, as is the case with a retail dealer. It may be assumed with certainty that it would be in vain to attempt to put out a fire in a large store-house with ammonia.

Finally, the third condition is that the ammonia be used in large amount and of sufficient strength. The ordinary commercial aqua ammonia has a specific gravity of 0·906, and contains nearly 10 per cent by weight of ammonia gas, but it can be made a good deal stronger, for *cold* water absorbs so much ammonia gas that when the water is perfectly saturated with this gas the solution contains nearly 47 per cent of ammonia. The stronger it can be used, the more gaseous ammonia will be evolved on heating it, and the more efficient it will be for extinguishing a fire. But in no cases should ammonia water be used that has a higher specific gravity than 0·960, and hence contains less than 10 per cent of gas.

Unfortunately it is impossible to say definitely how much ammonia ought to be kept in a petroleum room as a precaution against fire. For while it is easy to determine the cubical contents of the room, experience is lacking to tell what volume of ammonia must be mixed with a given volume of air to extinguish a flame in it. Nor is it possible to tell how much of the ammonia which is there will be evaporated if a fire breaks out, and how much ammonia gas will be evolved and mixed with the air. Yet there will only be a greater or smaller portion of ammonia liberated according to how much heat is produced.

In 1881, Schlumberger proposed to extinguish a fire in a petroleum store quickly at the outset by keeping a large closely stoppered bottle of concentrated ammonia on every barrel, so that in case of a fire or explosion the bottles would break and the evolved fumes of ammonia prevent the fire from spreading any further. Schlumberger employed this simple method with the best results in his extensive experiments on the distillation of petroleum.

Assuming that a large bottle held 10 liters of water of ammonia, and this contained but 10 per cent of gas, so that in the 20 liters there is dissolved not quite 2 kilos (1,920 grammes) of ammonia, and if on the breaking out of a fire only half of it vaporizes or is converted into gas, it would still fill quite a large space with ammonia gas. The weight of a liter of ammonia gas is at 0° C., and under the normal pressure only 0·7617 gramme, so that 1 liter of liquid ammonia would produce 1·313 cubic meters (48½ cubic feet) of gaseous ammonia, measured at the freezing point of water. At the high temperature produced by the burning oil the gas would naturally expand and fill a much larger space.

It must also be remembered that Schlumberger's proposition, to put a large bottle of ammonia on each barrel, could be easily carried out without interfering at all with business. The cost of ammonia can scarcely stand in the way of its use for prevention of petroleum fire from spreading, because at retail 100 kilos (220 lb.) can be had for $9.25. If no fire takes place none of it is lost, and when it is no longer needed it can be easily dispensed with.

The use of water of ammonia as a preventive of petroleum fires, or rather to extinguish a fire that breaks out in a small store of it, ought to attract the attention of companies and societies concerned in extinguishing fires, and although the matter has not yet been so thoroughly tested that the owners of these store-houses can be *compelled*, as Schlumberger proposed, to keep closed bottles full of ammonia in the cellars where petroleum is stored, it might be well to recommend that this should be done, leaving it to the owners, if they would consult their own interest, to carry it out.—*Deutsche Industrie Zeitung.*

An illustration of the action of ammonia gas in extinguishing flame was afforded recently at a fire in Scharmann's brewery in Brooklyn, E. D. While repairing the Delamater ice machine the ether vapors took fire, and an explosion followed which enveloped the whole building in flames. As a result of the heat the ammonia machine exploded, and liberated such an enormous amount of ammonia gas that it checked the fire and prevented it from spreading to the neighboring buildings.

Novel Telegraphic System.

The Mutual Union Telegraph Company proposes to adopt a new method of doing business by telegraph. The plan is not unlike the telephone system. To illustrate the scheme: Suppose that A in New York finds in the course of the day that he wishes to settle a certain matter with B, of Chicago. He sends word to the Mutual Union office to send to B, asking if he can be in the Chicago office of the Mutual Union at, say, 4 o'clock, in order to talk with A. If the answer is "Yes," then the two meet at 4 o'clock, one in Chicago and the other in New York, and two operators ask and answer whatever questions and answers are sent over the wire. In this way there will be no opportunity for delays or misunderstandings.

Grape Leaves for Pickles.

A writer in the *Country Gentleman* recommends the use of fresh green grape leaves to place on top of pickles in jars in place of flannel or other cloth usually employed. He claims the leaves will preserve the vinegar sharp and clear and impart a nice flavor. The leaves should be rinsed in pure water and left to drain before use, and occasionally changed. They exclude the air, and besides imparting a delightful flavor to the pickle cause less trouble to the housewife.

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ENGINEERING INVENTIONS.

An improved mechanism for applying brakes to the wheels of cars has been patented by Mr. John C. Glass, of Verona, Pa. The brake shoes are suspended by links and are fitted on their rear sides with toothed wheels. On the piston rod of a steam or air cylinder, placed above the brake shoes, is adjustably secured a wedge-shaped block that is toothed on its edges to correspond with toothed wheels with brake shoes. When the piston is drawn upward the wedge block draws between the brake shoes, pressing them against the wheels.

Mr. Henry D. Thorp, of Fort Wayne, Ind., has patented an improved car coupling. In the opening in the drawhead is placed a latch, bent upward at its front end to form a head, and having behind it a spring that presses it outward. In the latch is an aperture through which the coupling pin can pass, and when the latch is pressed out the coupling pin rests on the rear side of the aperture. When the cars are run together the bumper strikes the head of the latch, pressing it back and allowing the pin to drop to couple the cars.

Mr. John Houpt, of Springtown, Pa., has patented an improved pump for supplying steam boilers with hot water. The feed pump of the boiler is vertical and of the usual construction, and between the feed pump and the feed water heater is placed an auxiliary force pump. The pistons of the two pumps are reciprocated simultaneously in the same direction, thus always supplying uniform charges of hot water to the feed pump cylinder.

Improvements in automatic car brakes have been patented by Messrs. Lafayette D. Hawley, of Ada, and Addison R. Spalding, of Lake City, Minn. The brake cars and shoes are of ordinary form, and upon the brake bar at the end of the car is pivoted an angle plate which carries a buffer rod provided with a spring to throw it forward. On the outer end of the rod is a buffer plate, and when the cars are run together, the buffer heads come together, the rods are moved, moving the brake bars to brake the wheels.

Mr. Jackson J. Kennedy, of Cleveland, Tenn., has patented a car coupling in which the draw bars are oscillating shafts, having on their outer ends peculiarly constructed goose-neck coupling hooks, which are permanently held in a position for coupling by weights that tend to rock the shafts. When the cars come together, the hooks strike each other, and by their peculiarshape cause the shafts to rock and the weights to throw and hold the hooks into a coupled connection. Devices are provided for locking the hooks open or closed.

ELECTRICAL INVENTION.

A device for giving an alarm as soon as the locking bolt is thrown back in the lock has been patented by Mr. James P. Freeman, of New York city. Contact strips attached to the sliding bolt of the lock rest in such a manner against a slide for closing an electric circuit, that when the door is locked the circuit will be broken, and when the bolt is drawn to unlock the door the circuit will be closed and the alarm sounded on a bell placed in the circuit.

AGRICULTURAL INVENTIONS.

Improvements in thrashing machines, by which grain is prevented from being carried over the tailboard of the machine with the straw, and also that prevent the sieves from clogging, have been patented by Mr. Henry M. Green, of Lowell, Wis. To the lower edge of the board that feeds the thrashed straw and grain to the sieves are attached fingers that allow the grain to drop through, while the straw and chaff are brought into suitable position to be operated upon by the air blast. A tail board inserted in the shoe of the sieves catches the headings, and they are returned to the cylinder to be re-thrashed.

Mr. Fontain P. Hoke, of Sullivan, Ill., has patented an improved method of adjusting the rear end of a plow beam to or from the land. The landside of the plow is secured to a standard that is provided with a rear brace that is curved forward at its upper end, and is provided with an inwardly projecting arm that is serrated on its under side. The beam is pivoted to the standard, and at its rear end is slotted and secured by a bolt to the arm of the brace, the head of the bolt engaging with the serrations to hold the beam firmly in place as adjusted.

Mr. William Scott, of Buffalo, W. Va., has patented improvements in wheel cultivators, whereby the axle is adapted to pass over tall plants. The connection between the axles consists of arched bars that are sufficiently elevated to allow the plants to pass under. The tongue is also so secured to the arched bar that the whiffletrees do not break the plants. Between the front and rear bars is a connecting reach, upon which is placed a driver's seat, and also levers by which the cultivator bars are raised or lowered as desired. The driver's seat is provided with a cover, and foot rests are secured to the reach.

A combined scraper and cultivator has been patented by Mr. Dabney Hardy, of McFarland's, Va. The plow beam and handles are of the usual construction, and near the rear end of the beam are secured adjustable standards that support the cultivator plow in such a manner that they can be raised or lowered as desired. In front of the cultivator plows is adjustably secured a standard, to the lower end of which is attached a scraper, placed in an inclined position with the plow beam. The machine may be used as a scraper and cultivator combined, or as either singly.

An adjustable furrow opener for attaching to the legs of a land marker has been patented by Mr. George W. Nutter, of Corinna, Me. The furrow opener is made with a double mould board, and has on its back a curved bar that fits into a corresponding recess in a bearing block that fits upon the leg of the marker to which it is held by an eye bolt and nut. By loosening the nut the opener may be adjusted to work deeper or shallower as desired for planting the seed.

Mr. William B. Packard, of Bloomington, Ill., has patented improvements in sulky plows by which they are more easily controlled and adjusted. The axle of the wheels is bent at right angles to raise its middle part to enable it to pass over tall plants, and support a frame to which the driver's seat is secured. The plow beam is adjustably pivoted at a little distance from its end to a bail that is adjustably secured to the axle, and is raised or lowered by suitable devices under control of the driver from his seat.

TEXTILE INVENTION.

Messrs. John Wiggins and John B. Greenhalgh, of Waterford, Mass, have patented a mechanism for reversing the rotation of the spindles of spinning jacks and mules, without changing the bands or reversing the race belt. The main pulley of the shaft of the mule frame that carries the cylinder from which the spindles are revolved is so secured to the shaft that it may be fast or loose, and to one end of pulley a bevel gear is secured that engages with other bevel gears to turn the cylinder in either direction according as the pulley is tight or loose on the shaft.

Mr Isaac W. Lamb, of Parshallville, Mich., has patented improvements in knitting machines for moving the needles in and out of the path of the cam, so as to increase the range of work and avoid the risk of injury to the needles. The needle beds are constructed in sections, providing grooves of sufficient depth to receive the needle shifters and suitable devices for controlling and operating them, thereby adapting any machines to have needle shifters, and their corresponding advantages.

MISCELLANEOUS INVENTIONS.

An improvement in sights for firearms has been patented by Mr. Frederic J. Gardner, of Elm St., Walnut Hills, Cincinnati, O. This improved rifle-sight is more particularly intended to be used for target practice; and it consists of both a front sight and rear sight of peculiar and advantageous construction, the fore or front sight being opaque, of tubular construction, with a transparent cross plate or disk of glass having a sight-hole in it, and the rear sight comprising a transversely-slotted body and a transversely-adjustable cross-slide provided with a sight-hole within range of the slot in the body of the rear sight.

An improved vessel anchor has been patented by Mr. Abram A. Goldsmith, of Charleston, S. C The anchor has two circular concave surfaces, and on periphery between the surfaces is a V-shaped groove. In this groove is placed a loose band that encircles the anchor, and to it is secured the anchor chain. With this construction the chain is free to play with the tide without disturbing the anchor.

Mr. J. E. Tynan, of Paterson, N. J., has patented improvements in machines used for spinning, doubling, and respinning silk by a continuous operation. The improvements consist in driving the spindles by means of friction wheels, or disks, and also in a peculiar combination of devices by which, when a thread breaks, the bobbin ceases to wind and the feed pulley to operate.

Improvements in machines for felting and scalding hat bodies have been patented by Mr. Jarvis C. Brush, of Newburg, N. Y. The machine consists of a vat having a perforated steam pipe or chest in its lower part and above the pipe polygonal rollers of different diameters connected and operated by sprocket wheels and a chain at one end of the rolls. The hat bodies are rolled up and placed in the space between the rolls and the rollers revolved, the shape of the rollers causing them to beat and turn the hat bodies.

Improvements in tuyeres have been patented by Mr. Jacob Stoll, of Milwaukee, Wis. The pipe that leads from the blower is curved and threaded at its external end, and to it is attached a perforated and chambered head. The head is perforated in such a manner that a portion of the blast escapes into a chamber formed around the pipe, carrying out all gases or dust from the forge and preventing them from entering the blower, to interfere with its action or to cause explosion.

Mr. William E. Smith, of Berwick, Pa., has patented an ink well for school desks, that is adapted to be hermetically closed when not in use to avoid the waste of ink. The ink well is placed in a hole in the top of the desk, and is provided with a pivoted cover having a yielding packing, and the cover is held to the top of the well when it is closed by a pivoted curved arm attached to the frame of the well and engaging an inclined surface on the top of the cover.

A device for adjusting the tension of eye glass springs has been patented by Mr. Frank R. Woodard, of Hill, N. H. The eye glass spring is formed of two spring strips attached to the respective lens frames, one of the springs being provided with a longitudinal socket for receiving the end of the other spring, and in which the strip slides, permitting the spring to be lengthened or shortened, and by this means its tension to be increased or diminished, as desired.

An improved grain meter has been patented by Mr. Robert H. Edmiston, of Americus, Kan. A rectangular bin is divided into two compartments of equal size, their bottoms being hopper-shaped and provided with delivery openings over which are gates hinged to open outward. The compartments are filled with grain from a movable spout. When one compartment is filled the grain runs over into a pan. The weight of the grain in the pan serves to operate a lever that carries the spout and grain to the opposite compartment, and opens the gate at the bottom to discharge the grain.

A faucet adapted to be fastened in a barrel and removed again without causing any loss of the contents of the barrel has been patented by Mr. Gustav A. Naumann, of Newark, N. J. A screw plug is closed at its inner end by a swinging valve, having on its upper end teeth that engage with teeth on a block mounted on a screw-spindle in the plug. When the spindle is turned the valve is moved to or from the inner end of the plug.

An improved iron post for fences, to which the wires are easily applied and that is strong and durable, has been patented by Mr. John J. Kimball, of Naperville, Ill. The post is formed with three wings at equal angles, two of which are in the line of the fence, and the third at right angles to the line. On the faces of the two wings are recesses to receive and hold the wire, and above the recesses are lugs, and nails are driven between the wire and the lugs to hold the wire. Suitable braces are provided for holding the posts upright.

A clothes drying apparatus that furnishes a large amount of line in comparison with the length and width of space occupied, has been patented by Messrs. David H. and Jerome H. Payne, of Troy, N. Y. A post is set a suitable distance from the house, and at its upper end has a cross bar. Stout wires extend from the ends of the cross bars to a window in the building to which they are attached. Racks carrying lines for clothes are suspended by sheaves on the wires, and are moved out from the window as they are filled with clothes.

An improved optometer for ascertaining the proper correction for defects in sight has been patented by Mr. Alfred A. Trowbride, of Danbury, Conn. A plate having two apertures for lenses, the centers of which are on a horizontal line, has also a nose opening and a handle, and from the back of the plate a hood extends to the sides of the face to shut out the light from the eyes. The lenses are on adjustable slides, so that the center of the lens may be exactly in front of the eye looking at a test object.

An improved milk strainer has been patented by Mr. George W. Sutfin, of Dundee, Ill. The body of the strainer is in the shape of an inverted siphon, in the bottom of which is placed a removable strainer and pocket to collect the sediment from the milk. The receiving side has placed in it a deflecting cone to break the fall of the milk when poured in, and the delivery side has a fine strainer through which the milk passes to the drawing faucet.

A device for providing oil for the purpose of lubricating oil stoves has been patented by Messrs. James B. and Burrell A. Pierce, of Browne Hill, Va. In the lower side of the block in which the oil stove is set is placed an oil reservoir, having a filling and a discharge tube. The oil is forced from the reservoir by a piston attached to a rod protruding from the end of the block, and flows through the discharge tube on to the surface of the stove.

A mechanical movement for producing reciprocating motion has been patented by Mr. Anton Dilger, of Rockville, Wis. A horizontal shaft fitted in a frame has at one end a pinion that engages with a rack fitted for vertical movement in an upright secured to the frame. Upon the outer end of the shaft is hung a weighted pendulum. When the pendulum is vibrated the pinion imparts a reciprocating motion to the rack bar.

An improved fastener for securing buttons upon shoes has been patented by Joseph C. F. Dick, of Belvidere, Ill. The fastener is made in the form of a staple, with two points for entering the leather, having a groove to receive the button eye or shank. A tongue formed by cutting out the metal of the staple between two of the prongs, is of such a length that it covers and holds the eye of the button in the groove, and it cannot slip on the fastener in securing it to the shoe.

A double tree, adapted to be used without single trees, and capable of equalizing the draught when one horse gets ahead of the other, has been patented by Mr. Jeremiah C. Jones, of Whitt, Texas. The double tree is formed with a mortise in the center and has hooks at each end. In the mortise a pulley is secured, upon which is placed a chain provided at each end with a hook to which the inside trace chains of the harness are to be hooked. It will be seen that the action of the chain on the pulley is such as to equalize the draught between the horses.

Mr. Henry F. W. Koehler, N. W. cor. of Twenty-third and Calhoun streets, St. Joseph, Mo., has patented a dumping wagon that is adapted to be used also as an ordinary carrying wagon. The box consists of fixed side board secured to the stakes at one end of the bolsters, and a dumping portion consisting of a bottom board, side board, and end pieces, all rigidly secured together. A central bar, secured to the underside of the bottom board, is journaled in bearings on the bolster. By suitable devices the dumping is retained in position to carry a load, also to be dumped to empty its load.

An adjustable tracing wheel for marking garment patterns to give the proper width for basting the seams has been patented by Martha E. Kellogg, of Flint, Mich. The handle of the wheel has a metal shank having at its lower end a transverse shaft. A tracing wheel with a toothed edge is mounted on one end of this shaft, and a sharp edged cutting disk is mounted at the opposite end. The cutting disks cut the cloth or paper, and the toothed disk marks the lines for basting the seams.

Mr. Martin B. Wood, of Estillville, Va., has patented an improved heel for boots and shoes that is lighter and more durable than heels of ordinary construction. The heel is made of iron, and is a hollow cup of the shape of the heel placed against the heel tap on the bottom of the sole. The under surface of the heel tap is recessed around its edge to receive the edge of the heel cup, and the cup is held to the tap by screws which are screwed into the sole.

Mr. William F. Crowell, of Las Vegas, N. M., patented an improved wheel for vehicles that is so constructed that any shrinkage of the wheel may be taken up without removing and resetting the tire. The improvement consists in constructing the wheel with a wedging device between the ends of the fellies, that when the tire becomes loose may be drawn down by bolts to spread the fellies and to tighten the tire.

Mr. Frank M. Harris, of St Charles, Mo., has recently patented a device for splicing wires. The device consists of two bars of iron or steel connected by a handle at one end, and having at the opposite end tapering notches opening toward the handle, and a similar device having notches projecting from the handle, the two forming a clamp to hold the lapped end of the wires when their handles are drawn together. By means of a twisting tool the wires are then twisted to form the splice.

Mr. Peter Goergen, of Buffalo, N. Y., has patented a coal box that takes but little space, and from which the coal can be shoveled very conveniently. The box has an opening at the bottom of one of its sides, and opposite the opening is a trough placed parallel with the side that has an inclined piece extending from the top to the bottom of the trough. At the inner corners of the box are bevel corners for guiding the coal through the opening.

A combined book marker and paper cutter has been patented by Mr. Frank D. Adams, of Auburn, Cal. The cutter is formed of a straight elastic blade for cutting the leaves of a book, and also with a tongue connected to the blade at one end. The tongue is curved toward and then from the plane of the blade, so that it may readily pass into books, while the blade acts as a spring to grip the back of the book to hold the marker in place.

Improvements in water tuyeres for forges have been patented by Mr. Nils O. Swenson, of Terraville, D. T. In the face of the tuyere, which is of the usual form, is a large opening surrounded by four smaller openings, and to these openings the upper ends of the air pipes are connected, the lower ends being connected with openings in the valve plate of the air chamber. Beneath the face plate is a water chamber that surrounds and protects the air pipes, and is provided with an inlet and outlet pipe for the circulation of water.

Mr. Angus McKellar, of Fort Douglass, U. T., has patented an improved carriage brake in which the thrust of the brake is taken up by the axle instead of by the body and springs, as in the usual construction. The brake-shoe is suspended from the body in front of the wheels, and is connected by rods to the short arm of a rock shaft pivoted to the rear axle. The long arm of the rock shaft extends forward and is connected by a rope passing over pulleys on the body to a foot lever to be operated by the driver.

An improvement in the centerpiece of stove tops that prevents warping from heating, has been patented by Messrs. William P. Buell and John Wright, of Gallipolis, O. The piece is divided transversely at its middle in two parts, each of the parts having at their adjacent ends lugs that overlap each other, are pivoted together, forming a hinge in the center of the plate, so that they may rise from the pressure of expansion.

Mr. William McAfee, of Independence, Mo., has patented an improved apparatus for scouring and wringing yarn. The hanks of yarn are placed on rollers that revolve in the bottom of a tank and are thorough scoured by the action of the water and soap in the tank. When sufficiently scoured the hanks are attached to a hook at one end and a lever at the other. The hook is adapted to be revolved by a friction disk when the lever is pulled, thereby wringing the yarn.

A life-preserving mattress has recently been patented by Marshall H. Holmes, of St. Paul, Minn. The mattress is similar in shape to the ordinary mattress, and is filled with cork shavings to give the necessary buoyancy. The mattress is inclosed in a wooden frame and fitted to slide in ways like a drawer in a state room, and may be easily taken out to be used as a life-preserver. The mattress is secured to the frame, as are also oars for propelling it. A central hole in the mattress is closed with a removable filling, and under the hole is a strap secured to the frame to support a person in the hole.

Mr. Chapin C. Brooks, of Lancaster, N. H., has patented an improved log setting apparatus. A shaft runs lengthwise of and is mounted on the log-saddle, having a spirally grooved drum near each end of the saddle. On each of the drums a chain is wound that extends to the two sides of the carriage. The shaft is turned to draw the saddle back and forth on the head blocks of the carriage by means of a hand lever and toothed wheel and pawl.

Messrs. Henry M. Wise, Victor M. Stevens, and Bennett Chapman, of Oskaloosa, Kan., have patented an improved churn power. A spring power motor is combined with a churn having a rotary dasher, the power being secured to the cover of the churn, and the speed shaft that rotates the dasher being provided with a weighted brake lever on which the weight may be moved from time to time as the spring relaxes, to regulate the motion of the dasher.

Improvements in shoes, by which they allow more freedom to the feet of the wearer, have been patented by Mr. Thomas J. Strickland, of Randolph, Mass. The instep portion of the inner sole is left free, and the edge of the forward part is sewed to and between the out-turned edge of the vamp and the edge of the outsole. The rear part of the vamp and the forward part of the quarters are sewed to the edge of the outsole. The edges of the rear part of the quarter and the counter are turned in and secured between the inner and outer sole in the usual manner.

A device for opening and closing gates from a distance either side of them has been patented by Mr. James W. Morrison, of Logansport, Ind. The gate is of the ordinary construction, and on the upper end of the rear end bar is a spindle, upon which is placed a cap wheel. Around the spindle a spring is coiled that brings the wheel back to its normal position after being turned in either direction. On the under side of the wheel is a cam recess in which the upper end of a lever moves that operates the catch of the gate. Chains attached to the cap wheel and operated by levers, turn the wheel to operate the catch and swing the gate in either direction.

Improvements in "tubular" lanterns, by which the operations of lighting the lamp, cleaning the globe, and trimming the wick are facilitated, has been patented by Mr. G. E. Fifield, of Danforth, Me. The lantern has the lower ends of the tubes attached to a wire pivoted on the lamp, and a circular wire attached to the tubes rests on the top of the lamp, where it is held by a spring catch. A swinging plate on which the globe rests is pivoted to the tubes. With this construction the upper part of the lantern can be readily swung back and the globe removed and lamp cleaned.

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Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Woodworking M'ch'y. Bentel, Margedant & Co.,p. 251.

Lubricator. See advt., Detroit Lubricator Co., p. 252,

Poet of Poets. Whoever is entitled to this distinction, there is no doubt that the Esterbrook Falcon No. 048 is the pen of pens.

Send for List No. 7 of over 2,000 different new and second-hand machines, to Rollstone Machine Company, 95 Liberty Street, New York.

Heliographic or Blue Process Paper to take copies of Drawings, at Keuffel & Esser, 127 Fulton St., New York.

Wanted.—Machine for glazing or polishing linen collars and cuffs. C. Phillips, 82 Mark Lane, London, E. C., England.

Engines, 10 to 50 horse power, complete, with governor, $250 to $550. Satisfaction guaranteed. Nearly seven hundred in use. For circular address Heald & Morris (Drawer 127), Baldwinsville, N. Y.

Pat's Mfg'd on royalty. A. B. McCool, Pottsville, Pa.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Millstone Dressing Diamonds. Simple, effective, and durable. J. Dickinson, 64 Nassau street, New York.

Gould & Eberhardt's Machinists' Tools. See adv.,p. 254.

For Heavy Punches, etc., see illustrated advertisement of Hilles & Jones, on page 252.

Barrel, Key, Hogshead, Stave Mach'y. See adv. p.254.

Magic Lanterns and Stereopticons of all kinds and prices. Views illustrating every subject for public exhibitions, Sunday schools, colleges, and home entertainment. 116 page illustrated catalogue free. McAllister, Manufacturing Optician, 49 Nassau St., New York.

Vertical Engines, varied capacity. See adv., p. 254.

Combined Concentric and Eccentric Universal and Independent Jaw Chucks. The Pratt & Whitney Co., Hartford, Conn.

For best low price Planer and Matcher, and latest improved Sash, Door, and Blind Machinery, Send for catalogue to Rowley & Hermance, Williamsport, Pa.

The only economical and practical Gas Engine in the market is the new "Otto" Silent, built by Schleicher, Schumm & Co., Philadelphia, Pa. Send for circular.

The Sweetland Chuck. See illus. adv., p. 254.

Steam Pumps. See adv. Smith, Vaile & Co., p. 252.

The Porter-Allen High Speed Steam Engine. Southwork Foundry & Mach. Co.,430 Washington Ave.,Phil.Pa.

Knives for Woodworking Machinery,Bookbinders, and Paper Mills. Taylor, Stiles & Co., Riegelsville, N. J.

Small articles in sheet or cast brass made on contract. Send models for estimates to H. C. Goodrich, 66 to 72 Ogden Place, Chicago, Ill. Mention this paper.

Calcium Light Apparatus and Stereopticons at low prices. C. Beseler, 218 Centre Street, New York,

Bostwick's Giant Riding Saw Machine, adv.,page 238.

For Mill Mach'y & Mill Furnishing. see illus. adv. p.236.

See New American File Co.'s Advertisement, p. 238.

Woodwork'g Mach'y. Rollstone Mach. Co. Adv., p. 238.

Wanted.—Liberal inducements and facilities for locating large iron works. Address Iron, Manchester, N. H.

Schools open.—Send for Catalogue of Drawing Materials. Keuffel & Esser, New York.

25" Lathes of the best design. G. A. Ohl & Co., East Newark, N. J.

50,000 Emerson's Hand Book of Saws. New Edition. Free. Address Emerson, Smith & Co., Beaver Falls, Pa.

Cope & Maxwell M'f'g Co.'s Pump adv., page 220.

The Berryman Feed Water Heater and Purifier and Feed Pump. I. B. Davis' Patent. See illus. adv., p. 220.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 222.

Red Jacket Adjustable Force Pump. See adv., p. 220.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 220.

4 to 40 H. P. Steam Engines. See adv. p. 220.

Collection of Ornaments.—A book containing over 1,000 different designs, such as Crests, Coats of Arms, Vignettes, Scrolls, Corners, etc., will be mailed free on receipt of $1. Address Palm & Fechteler, 6 West 14th Street, New York.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 205.

Combination Roll and Rubber Co., 68 Warren street, N. Y. Wringer Rolls and Moulded Goods Specialties.

Pure Water furnished Cities, Paper Mills, Laundries, Steam Boilers, etc., by the Multifold System of the Newark Filtering Co., 177 Commerce St., Newark, N. J.

Latest Improved Diamond Drills. Send for circular to M. C. Bullock Mfg. Co., 80 to 88 Market St., Chicago, Ill.

First Class Engine Lathes, 20 inch swing, 8 foot bed, now ready. F. C. & A. E. Rowland, New Haven, Conn.

Ice Making Machines and Machines for Cooling Breweries, etc. Pictet Artificial Ice Co. (Limited), 142 Greenwich Street. P. O. Box 3083, New York city.

Jas. F. Hotchkiss, 84 John St., N. Y.: Send me your *free* book entitled "How to Keep Boilers Clean," containing useful information for steam users & engineers. (Forward above by postal or letter; mention this paper.)

Steel Stamps and Pattern Letters. The best made. J. F. W. Dorman, 21 German St., Baltimore. Catalogue free.

For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

Presses, Dies, Tools for working Sheet Metals, etc. Fruit and other Can Tools. E. W. Bliss, Brooklyn, N. Y.

Supplement Catalogue.—Persons in pursuit of information on any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co.,139 Center St., N. Y.

Wood-Working Machinery of Improved Design and Workmanship. Cordesman, Egan & Co., Cincinnati, O.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

Presses & Dies (fruit cans) Ayar Mach. Wks., Salem, N.J.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

NEW BOOKS AND PUBLICATIONS.

CHATTER BOX, JR.

This is a handsome quarto volume containing an uncommonly fine collection of pictures and verses for children, calculated to afford an endless variety of amusement for the youngsters. The typography is superior, the paper and binding strong. It is one of the best of juvenile books that has come under our notice. R. Worthington, publisher, 770 Broadway, New-York.

THE BOOK-KEEPER'S COMPANION. J. G. Beidleman, Philadelphia. Price 75 cents.

This little work, by Thomas A. Lyle, accountant, is intended for the guidance of students and inexperienced persons in opening a set of books and keeping accounts accurately.

LIGHT: A COURSE OF EXPERIMENTAL OPTICS, CHIEFLY WITH THE LANTERN. By Lewis Wright. London: Macmillan & Co.

The author has been very happy in his choice of experiments intended to develop the physical realities which underlie the phenomena of light and color, and has been quite as fortunate in having his efforts supported by his publishers. In addition to some two hundred engraved diagrams of experiments and apparatus are eight plain and colored plates finely illustrating polariscope objects, the spectrum and its teachings, interferences of polarized light, and the various actions of crystals upon direct and polarized light. These illustrations go a long way to replace the experiments for the general student, while they furnish many helpful suggestions to the teacher of experimental optics.

SCOTT-BROWNE'S TEXT BOOK OF PHONOGRAPHY. By Mr. and Mrs. D. L. Scott-Browne. New York: D. L. Scott-Browne.

The authors of this text book are widely known as successful teachers of phonography. Their experience and good judgment are manifest on every page, especially in the relative simplicity and writableness of the forms they use and the classification of these for easy learning.

A DICTIONARY OF ECONOMIC PLANTS. By John Smith. London: Macmillan & Co. $3.50.

An enlargement and improved arrangement of the descriptive matter of the author's "Domestic Botany," published ten years ago. In this work the popular names of useful and ornamental plants are arranged alphabetically, followed by their systematic names and a compact statement of their history, products, characteristics, and uses. Mr. Smith's forty years of service as curator of the Royal Botanic Gardens, at Kew, have afforded him rare advantages for becoming practically acquainted with the plants which he describes. We have found the original work very handy and seldom disappointing as a book of reference, and can commend this improvement of it to all who have occasion to seek for general information respecting economic plants.

INDIANA: DEPARTMENT OF GEOLOGY AND NATURAL HISTORY. By John Callett, State Geologist, 1881. Indianapolis.

The newly established department for continuing the geological survey of Indiana is manifestly in good hands. This report is the first considerable attempt to illustrate the paleontology of the State, by the State. The new work covers the counties of Shelby, Fountain, Delaware, and Bartholomew. The report of our New York State Geologist, Professor James Hall, on the fossils of the Niagara group found at Waldron, Ind., is reproduced with thirty-two plates; seven plates give illustrations of some of the characteristic fossils of other formations, and there are twelve plates of fossil corals drawn and engraved by J. W. Van Cleve. The economic geology of Indiana is represented by about seventy quarries, mostly of limestone; some valuable beds of kaolin and coarser clays; and 216 coal mines. The development of the latter has only begun, yet Indiana ranks sixth in the list of coal producing States. The coal field covers nearly 7,000 square miles; a superior black coal prevails over an area of 600 square miles.

HAND BOOK OF THE ST. NICHOLAS AGASSIZ ASSOCIATION. By Harlan H. Ballard. Pittsfield, Mass.: The Author. 50 cents.

Two years ago the author suggested in *St. Nicholas* an extension of a society of young people which had been organized at Lennox, Mass., for the study of natural history, in imitation of the children's scientific societies of Switzerland. The suggestion took so well among the readers of *St Nicholas* that something like three hundred chapters of the Agassiz Association have been started, their geographical range extending from England and Ireland to Texas, California, and Vancouver's Island. This little hand book tells how these societies are organized, and gives a good many practical hints with regard to the preservation of specimens, the purchase of young naturalists' supplies, etc. The spirit of the movement is excellent, and we should be glad to see a chapter established in every schooldistrict.

UNITED STATES COMMISSION OF FISH AND FISHERIES. Part VII. Reports of the Commission for 1879. Washington.

In addition to a review of the special work of the commission in 1879 are several valuable reports and communications, of which the more important are Professor Farlow's "Marine Algæ of New England," and Professor Verrell's report on the Cephalopods of the Northeastern coast of North America.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) H. K. R. asks (1) what bruised Aleppo nutgalls are, and are they known by any other name. I find one of the ingredients in a receipt for ink in SUPPLEMENT, No. 157, and do not know the meaning of the expression. A. The galls referred to are blue or Aleppo nutgalls. They are excrescences due to insects found on certain varieties of quercus. When crushed (bruised) and digested with hot water they yield an extract containing a large per cent of tannin. 2. Can you refer me to some good work on electrotyping? A. See "Electrometallurgy," SUPPLEMENT, No. 310.

(2) J. C. H. asks how paper is prepared so that a brass pointer leaves a black mark on it. A. Dissolve a quarter of an ounce of pure sodium sulphide and half an ounce of sodium hyposulphite in a quart of rain water, filter the solution, and with it uniformly moisten the surface of the paper, then dry the latter under pressure between clean blotting paper.

(3) J. F. N. asks how gold and silver are refined at the U. S. Assay Office in New York, what kind of acid is used, and how is the silver precipitated? A. The bullion, after granulation, is boiled up with sulphuric acid, which dissolves the silver and leaves the gold behind. The silver is precipitated from this solution by strips of copper, which take its place in combination with the acid and produce blue vitriol, while the silver displaced is well washed and then melted into bars in the furnaces.

(4) I. S. asks: Will you please inform me how much salt and ice it will take to make a temperature of 22° Fah. A. Use ice and salt in the proportion of 12 of the former to 1½ of the latter. The ice should be crushed and well mixed with the salt.

(5) E. T. P. writes: In a late issue of the SCIENTIFIC AMERICAN you gave a receipt for restoring rubber that had become hard and brittle, by means of the vapor arising from kerosene. I tried the experiment with a glass fruit jar, the rubber suspended just above the oil. For thirty days, could discover no change in the rubber, and then substituted benzine, where the rubber has now hung for one week, but as yet there is very little change. Can you tell me why the experiment is not successful? A. Heat the oil over a sand bath away from fire.

(6) J. J. R. writes: 1. In Notes and Queries of your issue of August 19, No 9, R. D. asks about what is used for dark bronze; what kind of copper must he use, is it the metallic copper or the perchloride, same as the iron salt? A. It should read perchloride of iron and perchloride of copper. 2. After drying must this bronze be brushed or polished in some way to give it a glossy surface, and must it also be lacquered to keep so? A. It can be burnished with the burnishing tool or the rag buff. It stands exposure to the air very well, but retains the finish better if coated warm with a very thin clear lacquer of shellac in alcohol.

(7) C. W. asks: With what paint or material can I coat a water tank lined with sheet lead, so as to prevent the action of the water on the lead? A. Use pure asphaltum varnish. Give the surface two coats of this and let both dry thoroughly before water is allowed contact with them. After the first contact the coating will not materially affect the taste of the water.

(8) Miss M. C. asks (1) how coal oil is found. What does the earth look like? A. Consult "Coal and Coal Oil," and "Petrolia." Address for these and other books on the subject the booksellers who advertise in this paper. 2. If it should be near a well what would be the effect on the water? A. The water under such circumstances would be contaminated by the oil.

(9) A. D. C. asks for a recipe for mahogany stain to use on beech wood. A. A mixture of one part of glue, six of water, and sufficient brown oxide of iron to give the desired tint of color to a trial stick of wood, are mixed together by heat and stirring; more glue may be added if the coat is not sufficiently adhesive or rubs off; this is then, while hot, brushed over the article to be stained and well rubbed into the grain with a cloth. Two coats may be added if the wood is very porous or rough. The article, after drying, is then varnished over with a shellac varnish and polished when dry with a small quantity of linseed oil.

(10) W. B. N. asks: What are the ingredients of the soda dispensed from the soda fountains for drinking? A. The liquid is a solution, under pressure, in water of carbonic acid (gas). The gas is generated under considerable pressure in a closed vessel by the action of diluted sulphuric acid upon marble dust or ground marble. It is passed over into the cold water which absorbs it. The names soda or soda water are misnomers, as the liquid contains no soda. It was so miscalled from an imagined resemblance between it and the older effervescent beverages prepared from bicarbonates of soda or potassa and vegetable acids or acid salts.

(11) A. O. writes: I bought last year several barrels of apple vinegar which is now old and strong enough for use, but we find it is made partly at least of rotten apples, which give it a peculiar unpleasant taste. Can you advise some remedy? A. We know of no practical way of effectually removing the taste. You might try the following, which will in any event improve the taste and appearance of the liquid: Scald out a clean cask, add to and stir up with the vinegar one pound of fine granular bone black and a quarter of a pound of bisulphite of lime, then the whites of three eggs. Let it stand twenty-four hours, and carefully rack off the clear vinegar from the sediment into the clean cask. This should be kept in as cool a place as possible.

(12) J. S. P. asks: 1. Please give a receipt for making soft solder such as the tops of canned goods are sealed up with. All that I can get is too hard, as it takes too much heat to open the cans. A. Melt together lead, 1¼ pounds; tin, 2 pounds, bismuth, 2 ounces. The lead should be melted first, the tin added next, and finally the bismuth stirred in well just before pouring. 2. Please give receipt for making ink for marking cotton bales, one not easily washed off by exposure or blurred by handling —a blue black. A. Dissolve about 6 ounces of asphaltum (genuine) in 1½ pint of oil of turpentine; you can color with a sufficient quantity of lampblack or mineral black.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

J. M.—It is muscovite and iron sulphide—pyrite.—J. W.—The specimen is quartz. It is of no value unless of exceptional quality and procurable in large quantity.

COMMUNICATIONS RECEIVED.

Relation of Proportions of Pyramid to its Circle. By W. F. Q.

On Parhelia. By L. S.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

September 26, 1882,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired and remit to Munn & Co., 261 Broadway, corner of Warren Street, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

Addressing machine, P. York and G. V. Uhl 264,916
Animal catcher, J. W. Loree 265,113
Annunciator, speaking tube, J. Walter 264,977
Axle tap wrench, L. A. Gates 264,942
Axle, vehicle, J. P. Warner 265,196
Ball. See Exercising ball.
Banjo, J. Morrison 264,893
Bar. See Grate bar.
Barrel making machine, J. Massie 265,121
Basket making machine, J. Hibbard 265,079
Bearing, anti-friction, E. Salomon 265,152
Bed bottom, adjustable spring, M. N. Lovell 265,116
Bed bottom, spring, M. N. Lovell 265,114, 265,115
Beehive, J. Phillips 264,898
Beer, etc., apparatus for cooling, Mayer & Jungenfeld 265,123
Bell, call, J. Y. Fairman 265,045
Bell, door, J. J. Johnston 264,884
Beverage, aerated tonic, C. H. Frings 264,941
Binder, automatic, W. Bayley 265,215
Binder, automatic, G. F. Green 265,060
Binder, self, Whiteley & Thomas 265,199
Bit. See Bridle bit.
Block. See Printing block.
Blower, fireplace, B. G. Covington 264,863
Boiler. See Wash boiler.
Boiler furnace, M. S. Foote 264,871
Bookbinding, H. H. Hoffmann 264,878
Book-holder and arm rest combined, J. J. Armstrong, Jr. 264,995
Bookmakers' table shears, gauge for, E. P. Donnell 265,036
Boot or shoe sole fastening, S. W. Robinson 265,149
Bottle packing box, E. L. Mueller 264,894
Bottle stopper, G. & H. E. G. Luyties 265,118
Box. See Bottle packing box. Egg box.
Bracelet, A. Engelmann 265,044
Brake. See Car brake.
Brick elevator, J. C. Bobzien 265,012
Brick machine, G. Davis 265,030
Bridges, guard gate for swing, I. Savanson 264,969
Bridle bit, E. R. & C. E. Cahoone 264,925
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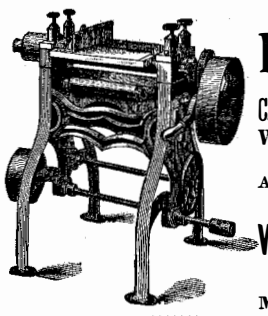

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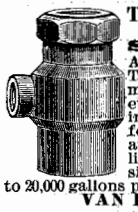

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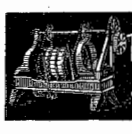

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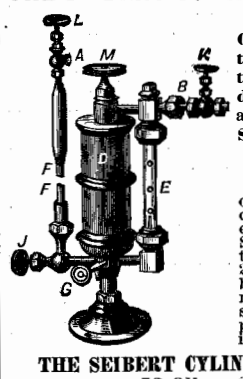

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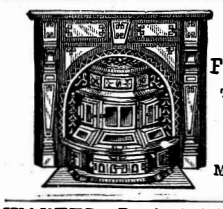

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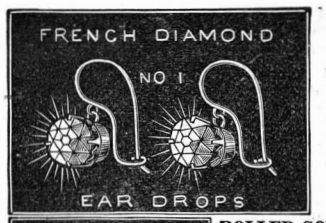

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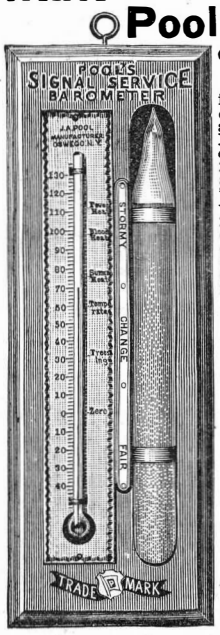

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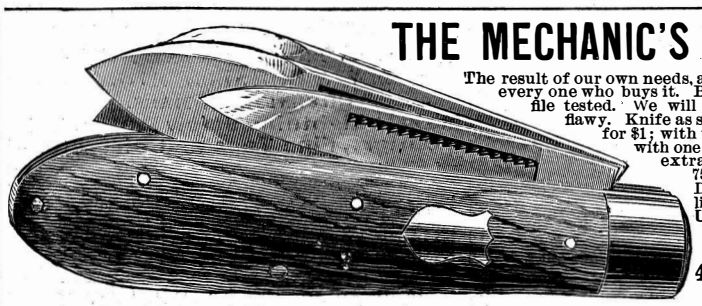

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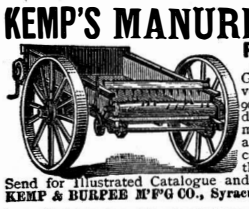

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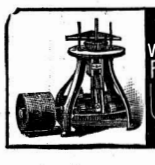

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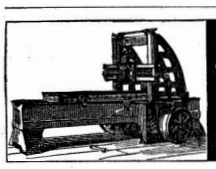

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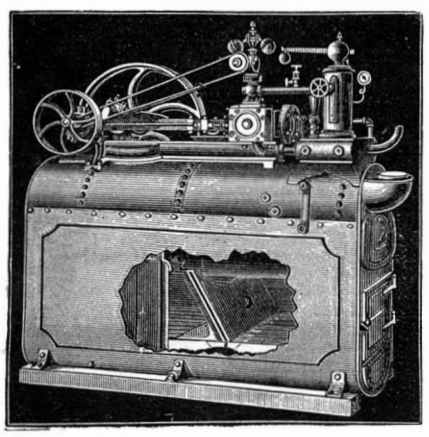
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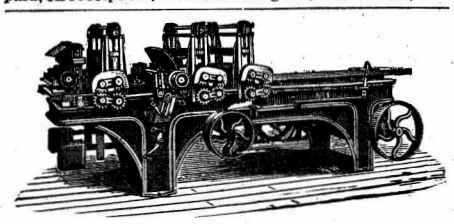
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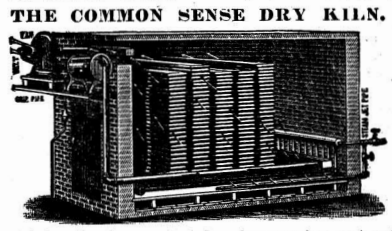
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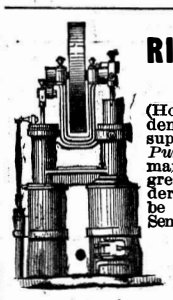
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